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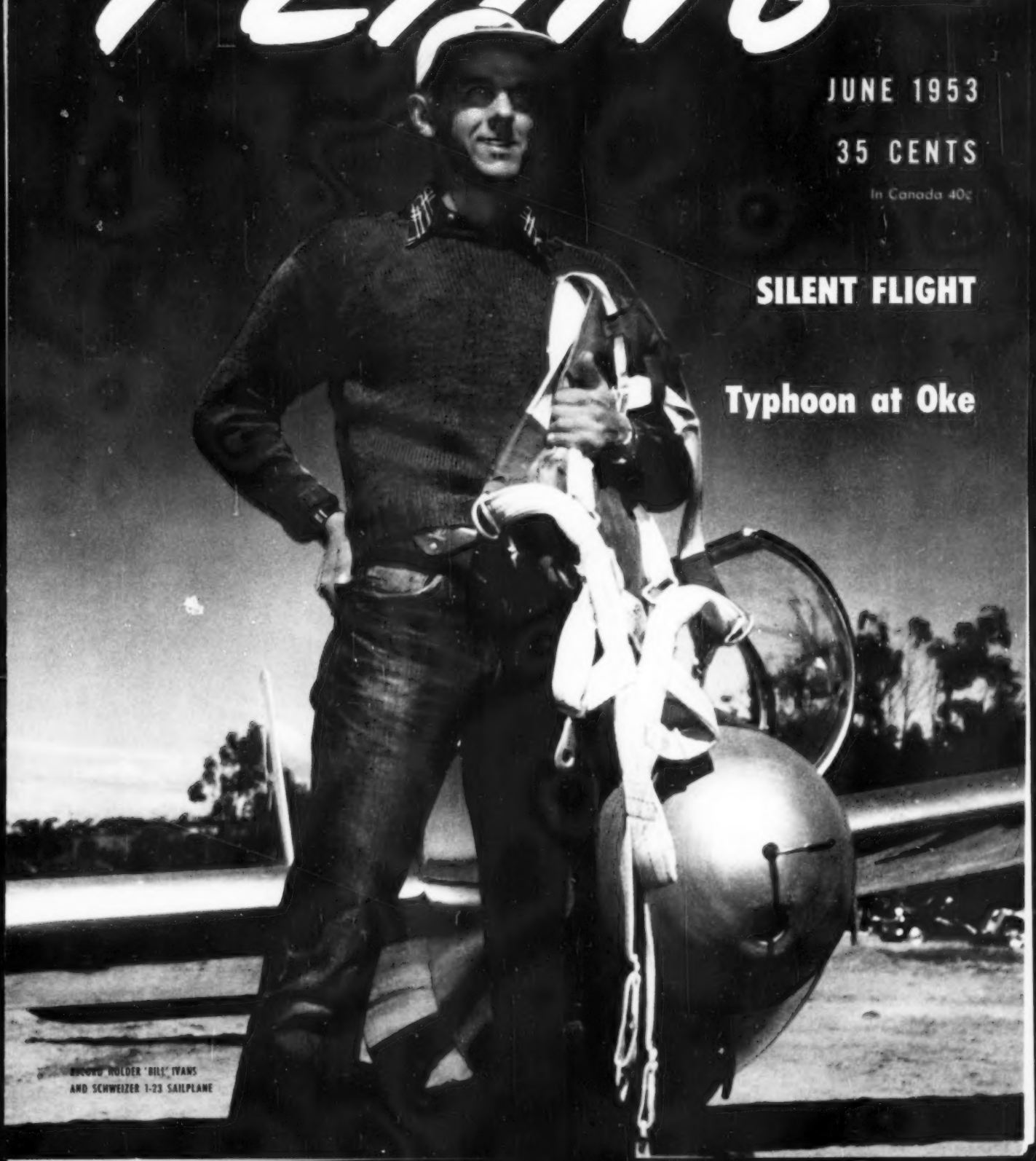

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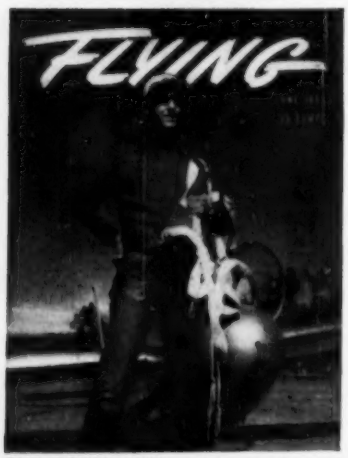

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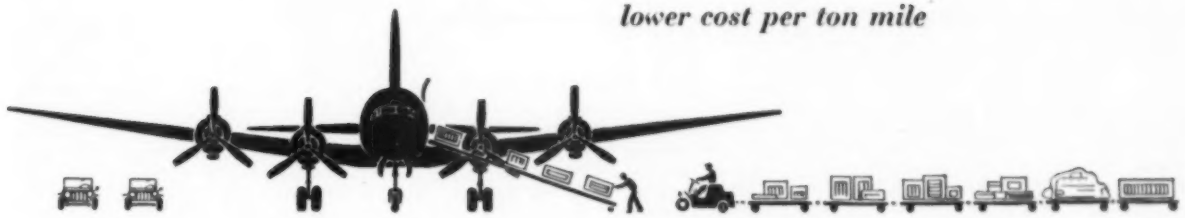

___the Douglas Liftmaster

Flying for the Air Force as C-118A and for the Navy as R6D, the Douglas Liftmaster delivers 14-ton payloads 2850 miles non-stop—at the lowest cost.

Outside, Liftmaster shows the same aerodynamic lines as its commercial counterpart, the DC-6A. Inside, there's room for 28,700 pounds of mixed freight. Large front and rear doors service cargo compartments. A self-powered loading elevator lifts 4,000 pounds from truck bed height to cabin floor level . . . fits either door. Through this combination of speed and utility, Liftmaster achieves the ultimate in long-range, low-cost transportation of military matériel.

Performance of the Liftmaster is further proof of Douglas leadership in aviation. Planes, produced in quantity *to fly faster and farther with a bigger payload*, are a basic rule of Douglas design.

Depend on *DOUGLAS* **First in Aviation**

MAIL BOX

DEFENSE ISSUE, cont'd

I have just received my copy of the Special Defense Issue of FLYING (March). One quick glance indicates that this is a great publication and one which deserves a deep chair and a quiet evening. Congratulations on such a fine tribute to the armed forces.

H. R. HARMON
Lieut. Gen., USAF
New York, N. Y.

From the Halls of Montezuma
Or the Cruising F3D
You have shown our country's battles
On the land and air and sea.

In the fight for right and freedom
And to keep our knowledge clear
For a job that's just magnificent
Wilson's FLYING has no peer.

E. THEODORE STERN
New York, N. Y.

Your Special Defense Issue was a humdinger.

CHARLES A. PARKER
National Aviation Trades Association
Washington, D. C.

Beyond the pleasure and interest, one cannot help being very measurably impressed and even indebted by the current data revealed in the Special Defense Issue of FLYING. Even to those who hadn't the opportunity to participate in the Air Corps during the late War, it must be awakening.

CHARLES H. McGRATH
New York, N. Y.

I wish to congratulate you for presenting such a newsworthy magazine. I believe it is the most informative that has ever been published about our Armed Forces. Combined with the special Air Force and Navy issues of 1951, it proves to me that FLYING is the only aviation magazine in the world that covers military matters thoroughly. I hope you continue to do the same.

JOHN ANDERSON
Gainesville, Fla.

I am greatly impressed with the issue and feel that it should be in our office. I have sent in a card ordering it for two years. I am also ordering another copy of the March issue since I want my Associate Editor to have one and I want the Managing Editor to have one for the library.

FRANCIS S. MURPHY
Editor and Publisher
The Hartford Times
Hartford, Conn.

You ought to be congratulated on the manner in which this issue was prepared, as the articles are more attractively presented than is the case with most of our "required reading."

D. DER. M. SCARRITT
Associated Aviation Underwriters
New York, N. Y.

We've had special issues on the Army, the Navy and a combination of all the services. Now how about giving the Private Pilot, the amateur, a break. Wouldn't it be fair to devote an issue to him?

HARLAND P. HOAK
La Habra, Calif.

Just a note to congratulate you on a splendid issue and to say that I enjoyed reading it very much indeed.

T. LEE BRANTLY
Vice President
Crowell-Collier Publishing Co.
New York, N. Y.

It is an excellent report of activities of all our branches of Service and I know I shall refer to it often.

I. I. SIKORSKY
Bridgeport, Conn.

Congratulations on your fine Special Defense Issue—and the perspective which lay behind it and made it possible.

WILLIS PLAYER
Director of Public Relations
Pan American World Airways
New York, N. Y.

Congratulations on a job very well done.

JACK FRYE
New York, N. Y.

HELICOPTER CLUB

This is to inform you of the formation of the International Helicopter Society. We are interested in helicopters and all forms of rotary aircraft, both models and full scale. There are members in the U. S. and England and we expect members to join from New Zealand, Australia, Canada and France.

Members are mostly of teen age but there is no age limit. We will publish a news letter shortly for all members. Anyone interested in joining is invited to get in touch with the undersigned.

BOB TENNENBAUM
461 Fort Washington Ave.
New York 33, N. Y.

OFF TO A FINE START

As a private pilot, plane owner and school teacher I was interested in the following item from "Ohio Schools":

"A Streetsboro, Ohio, science project recently included painting direction indicators atop the flat-roofed grade school. Seventh and eighth graders who painted the 12-foot letters were studying aeronautics, and Eugene G. Glick, principal, who is a licensed pilot, believes in showing the pupils practical applications of the things they learn in textbooks. He is also dickering for a War Surplus airplane motor for the class to take apart and reassemble."

MARY J. FECSER
Cleveland, Ohio

(Continued on page 8)

KIDS LIKE CAHILL

In Bridgeport, N. J., Operator Gordon Cahill, his brother Fred, Charley Hall, who is a teacher at nearby Paulsboro High School, and several pilot and aircraft owner friends have made flight training available to members of a Paulsboro High School aviation class at $1 per flying hour. More than 20 students have soloed. The project has no commercial angle. "We just like kids," explains Cahill. Needless to say, kids like Cahill.

Toledo, Ohio — Don Mcanally

Young man on the way UP

That air of success about so many young businessmen traveling TWA—there's a good reason for it. They've learned early that success is *in* the air . . . that the way to go places in business is to go places *for* business—fast and often! TWA is made-to-order for that. Key cities coast to coast and overseas are linked with the speed and frequency and luxury service that make for successful trips. Mighty comfortable ones, too!

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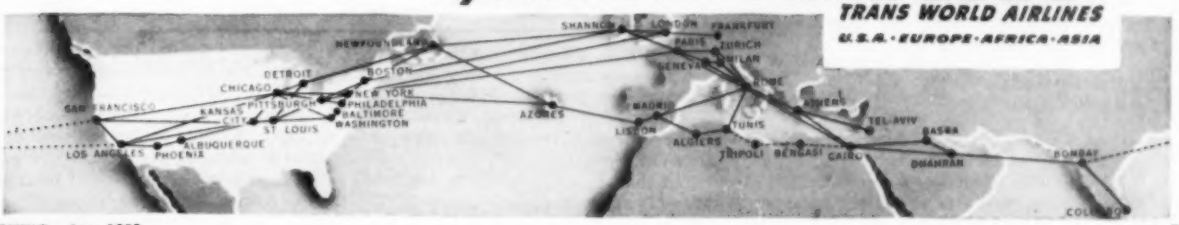


MAIL BOX

(Continued from page 6)

INSTRUMENT PROBLEM

Let's have unsymmetrical instrument panels that put the instruments where the pilot can see them.

This was no problem in most of the older and smaller planes which had rather narrow panels. Now I have a nice, comfortable four-place plane, but I have to embrace the party in the right front seat in order to read the tachometer, it is so far to the right of the symmetrical panel layout. This is quite all right at times, but can also be a scratchy experience when the passenger happens to be male.

The CAA says the instruments must be visible to the second pilot for dual control use, but many four-place ships are so seldom used for instruction that it would seem more sensible to follow automotive practice and put the dials in front of the left seat as far as possible.

REGINALD WOOD

New Milford, Pa.

TAKE A BOW, TULSA

To Loren Carlberg's letter in the February Mail Box I add my whole-hearted "Ditto!" The boys at the Tulsa airport are everything he said, and more. It was while at the Tulsa airport, as a struggling Spartan student, that I first heard the control tower say "Good day," or "Have a nice trip," in addition to the customary "Cleared to leave tower frequency." All this in spite of the fact that I had a beat-up BT-13 and was a struggling newcomer to two-way radio procedure. It made me feel they didn't mind too much that I did a lot of stuttering and hesitating through the mike.

After I left Tulsa in 1947, I returned some years later to find the same youthful "line boy" who had been there when I left. I thought he was just a kid starting to work there when I left, but found out he had been on the job for eight years. Even so, he still directs you to your parking place like he's just starting out and wants to give you the best of everything in the place.

AL BEYER

Freeport, Ill.

FLYING PROFESSORS

I have enjoyed your recent editorials on our lack of vision with respect to youth and the air age. The article on "Flying Professors" also was interesting and, I think, overdue. The U. of Illinois set-up is really outstanding and Les Bryan has made a real contribution. Also I am proud of Dr. Harold Hand, an old buddy of mine, who has proved that the light airplane is a dependable workhorse day in and day out.

S. E. TORSTEN LUND

University of California
Berkeley, Calif.

AIR FORCE SHORTSIGHTED?

I read with growing concern the articles telling how the youth of America are not interested in flying as they should be and I can see this very thing at any airport.

I read in FLYING a month or so ago an article telling how badly the Air Force needed pilots. Why doesn't somebody in the Air Force get some sense and realize that a person can learn to fly as a civilian and without two years of college?

I myself was an Air Force pilot of World War II with only a high school education and yet did well enough to make Captain a year and a half after being commissioned. The group I was a member of in combat had less than 25 per cent college men and we were the leading group of our type in the Ninth Air Force.

The present attitude of the Air Force is that a man is more adapted to being a pilot if he has taken two years of animal husbandry in college than a man who has been flying since he was 16 and hanging around the airport since he was 10. Let's wake up the Air Force to the fact that all civilian pilots aren't morons.

VALMORE J. BEAUDAULT

Milford, N. H.

MODIFIED TRIO

Since you published the picture of the Clifton *Trio* (Mailbox, FLYING, March), we have modified the plane, adding a canopy and enlarging the vertical fin which has improved the speed about 5 mph. It now has much better forward stability.

I am enclosing a picture of the new *Trio*, as I have received numerous inquiries as a result of the other picture. The *Trio* now has a permanent type NX license certificate. Wing span 22'; length 16'; empty weight 630 lbs.; cruising speed 120 mph; rate of climb 1,000 fpm. The aircraft has proven very stable and performs exceptionally well with its 65 hp Continental engine.

JACK CLIFTON

La Junta, Colo.

THE AVERAGE FELLOW

I am 16; a high school student; a member of CAP. I am working as an aircraft mechanic's helper to finance my flying lessons and I go to night school, taking a course toward an A&E. I plan to go to college and take aeronautical engineering. As you can plainly see, aviation means a lot to me.

I would very much like to see aviation put back to where the average individual could afford it. Why not put back on the market a plane such as the Aeronca K or the J2 *Cub* so that the average fellow could afford it? It would mean more dough for hangar owners and more fun for the individual.

CECIL SCHMIDT

Cincinnati, Ohio

LOCKHEED'S

NEW SUPER HAULS FREIGHT FASTER, CHEAPER

On the opposite page you see illustrated the rear loading area of a big Super Constellation 1049-D, designed to carry more freight farther, faster and cheaper than ever before in history—closely approaching the sought-after 5¢ per ton-mile operating cost.

This all-cargo version of the Super Constellation culminates 7 years of special cargo research by Lockheed and is so different from the passenger versions that the fuselage requires separate production jigs.

The 1049-D utilizes the most economical form of power available to aircraft, the turbo-compound engine. Four of these Wright engines, each rated 3250 horsepower for take-off, give the Super Constellation a 332-mph cruising speed at 20,000 feet. It will fly the 3,459 miles from New York to London non-stop in 13½ hours with a payload of 14 tons, crew of 5 and full over-water equipment—will fly 24,500 lbs. non-stop to Berlin.

DESIGNED TO CUT COSTS

The Super Constellation was designed for "loadability," so as to assure maximum efficiency and cut costs in man-hours.

Total usable payload volume is 5568 cu. ft., equivalent to a storeroom 46.4 ft. by 15 ft. and 8 ft. high. Total floor area for cargo is 1032 sq. ft.

The integrated all-magnesium floor is the finest being installed in any air transport today, according to both commercial and military operators who have inspected it. Concentrated loads from skids and legs may exert up to 400 lbs. per square inch. Floor loads of 1000 lbs. per lineal foot or 300 lbs. per square foot may be applied in the main cabin.

SPECIAL TIE-DOWNS AND BUILT-IN CONVEYOR

Floor tie-down fittings in a grid pattern of approximately 20" x 20" provide for loads of 4,000 lbs. in any direction. Wall tie-downs will take up to 4,500 lbs. each.

At a push of a button the built-in conveyor will pull (or *push*) loads over 12,000 lbs. on rollers or dollies or will skid a load of 8,000 lbs., reducing man power to a minimum.

The all-cargo Super Constellation is completely heated, pressurized and refrigerated. Normal equipment includes dual heaters, superchargers and refrigeration units. This gives cargo operators complete freedom in operational planning and insures protection of the cargo, regardless of its type or the nature of the operation.

Leadership demands constant achievement

Air freight gets a new lift...via

SUPER CONSTELLATION

FARTHER—FASTER—CHEAPER! This has been the objective of all transportation since man invented the wheel. And civilization itself has progressed in direct ratio to improvements made in transportation.

Now, the new all-cargo Super Constellation will carry more things *farther-faster-cheaper than any commercial plane.* It will carry 35,000 pounds of cargo coast-to-coast in less than 8½ hours at the lowest cost in history. It will carry 27,500 pounds New York to London *non-stop* in less than 14 hours! That's a new lift for air freight.

All-cargo Super Constellations will soon serve Seaboard & Western and other leading operators.

LOCKHEED

AIRCRAFT CORP., BURBANK, CALIF., & MARIETTA, GA.

Look to Lockheed for Leadership

TWENTY LEADING AIRLINES CHOOSE CONSTELLATIONS AND SUPER CONSTELLATIONS — UNITED STATES: Capital Airlines, Chicago & Southern Air Lines, Eastern Air Lines, Pan American World Airways, Seaboard & Western, Trans World Airlines. OVERSEAS: Air France, Air India, AVIANCA, Braathens, B.O.A.C., El Al Israel, Iberia, KLM, LAV, Pakistan International, Panair do Brasil, QANTAS, South African Airways, Trans-Canada.

FLYING
VOLUME 52, NO. 6
JUNE, 1953

AN EDITORIAL

Tides and Men

THERE is substantial evidence that we Americans are becoming among the least airminded of an airwise civilization.

During 1952 less than four per cent of our population took advantage of commercial air transportation despite its comparatively low cost, ready availability, undeniable advantages and phenomenal safety record.

The year produced only 14,831 private flying licenses although the nation has more airports per population, more available planes per community and cheaper rates per student than any nation on earth.

As of January, 1953, only 34 privately operated mechanic trade schools remained in existence, and the Aeronautical Training Society estimates that but 12 of them appear to have much chance of survival. This in the face of an airline estimate of a mechanic shortage of 10,500 men in 1954.

The aircraft manufacturing industry is currently spending approximately $1,200 per man merely to recruit engineers from college graduating classes and miscellaneous sources. Nor is the educational pipeline full of potential engineers. The Engineering Manpower Commission rates the national shortage at 40,000.

The foregoing and additional data which can be documented could add up to eventual disaster. This ebb of airmindedness does not vary greatly across the spectrum of our national aviation requirements. Nothing less than a major resurgence will serve our purpose, since airmindedness is the climate of air power, and air power is the key to survival.

The writer believes we must return to an aggressive program of flight activity at the grass roots. Flight activity is the front door to national airmindedness.

This does not imply a subsidized civil training program. Far from it. It does imply a balanced partnership of Federal and local government with voluntary citizen effort, each element contributing its share within the sound limits of government and citizen relationship.

An example of this partnership which might reach the stature of a national program is an experiment devised by Mr. Max Conrad, one of the world's outstanding exponents of personal flying.

It is Mr. Conrad's idea that a lightplane kit or a plane supplied by Federal government or civic organization encouraged by government, partnered by local government in furnishing a community airport with hangar and shop facilities, and further partnered by local youth which would build, maintain and pay for flying the plane at rates within youth capacity to earn, could be developed into a national program.

Mr. Conrad calls his idea "The Winona Experiment," after the name of his home town in southeastern Minnesota. For this experiment the aircraft is being supplied by the Piper Aircraft Corporation. The City Fathers of Winona are providing the hangar and shop. The youth of Winona and its surrounding area are competing for the original 30 student places in Conrad's training program. Citizen Conrad acts in the role of flight instructor and supervising mechanic.

Detail at this point is largely irrelevant. What we seek is sound doctrine for a continuing nation-wide flight training program workable at the community level. The Conrad plan recognizes the validity of two major premises. One is that the volume of a nation's community flying is the true measure of its airmindedness. The second is that this flying must be contrived within the framework of political integrity and voluntary citizen effort.

Grass roots aviation has not been the sole victim of government subsidy which chokes out initiative with sugar, but it has been among the major victims. The "quick buck" has shot down more aviation initiative than any other single influence. We want no more cynical surrender to the idea that government is unimpeachable as Santa Claus. Yet neither can we accept the thesis that government has no place in effective partnership with the citizen who seeks to further national aims at the level of something so important as survival.

The Winona Experiment has the potential to serve the destiny of the nation itself. More power to Mr. Conrad's idea. It may not prove the whole answer to the ebb of airmindedness in the land, but it at least represents action at the necessary level.

Gill Robb Wilson

Gill Robb Wilson
Editor and Publisher

The Travel Card that gave "CREDIT" to the public

In 1934, when American Airlines issued the first credit card, proposed by C. R. Speers, an American sales manager, there was an immediate expansion of passenger traffic in the first class air travel field.

Up to then, all tickets had to be purchased by cash. This was a decided disadvantage to businessmen who found it necessary to carry large sums of money with them when they flew from one destination to another on an extended business trip. Credit cards developed customers for the airlines from firms who had not previously encouraged their personnel to fly on company business. Airline credit cards have become so popular and are now so widely used that they are accepted as evidence of credit at leading hotels and drive-your-self automobile agencies throughout the entire country.

The first issuance of credit cards is only one of many milestones in the history of air transportation introduced by American Airlines.

AMERICAN AIRLINES INC.

Americas Leading Airline

THE Douglas D558-D is a magnificent, beefy airplane, the sweetest ship I ever flew. Boiling along on all four rockets, she never failed to give me the ride of my life. She wouldn't take "no" for an answer, she just wanted to *go!*

Long before I ever flew the *Skyrocket* through the sonic barrier, I had put her through the toughest tests known to man or machine. She had passed every structural test without yielding. She was so soundly engineered that, from her first flight, not a single design change had ever been necessary. I was thoroughly satisfied she was so rugged that nothing short of a power dive into the ground could break her up. That's why I could fly her at any speed with no misgivings.

I flew through the sonic barrier many times during my three years of testing the *Skyrocket* and her prototype, the *Skystreak*. (The latter was the first of the high speed conventional airplanes, without rocket power or swept-back wings. It barely nibbled at the edge of the sonic barrier, while the *Skyrocket* whipped through with ease.) I flew the barrier at extremely high altitudes, and attained speeds hundreds of miles in excess of it. I also think I am right in saying that I have flown at supersonic speed closer to the ground than any other human.

People constantly ask me if my first supersonic flight was the biggest thrill in my career as a test pilot. The answer is—certainly! But not for the reason that I was scared, or expected to be killed. I have been far worse scared on far slower jobs. It was my biggest thrill mainly because I knew I was the second human to have done it. (The first: Major Charles Yeager, U.S. Air Force.) It was exciting to help pioneer into a strange new world of speed, to travel on beyond this forbidding human limitation. The flight in that world is glassy smooth—smoother than any flight at subsonic speeds. And "over there" I seemed to weigh only half my normal weight. Sounds crazy—but it's true.

Test piloting has its hair-raising moments, and I don't mean to give anyone the impression that Old Man May has ice-cold nerves, like Steve Canyon. After all, let's face it: a test pilot's job is to *test*. He's looking for trouble. I know of only one way to find out if an untried ship will come out of a terminal velocity dive—and that's to put it into one and see.

Gene May, beside the rocket tubes of the *Skyrocket*.

The memory of diving never fails to put me into a clammy sweat. It brings back a day during the war when I was testing the Douglas A-26 (known now as the B-26), a twin-engine attack bomber. Engineers had been experimenting with a new auxiliary power plant for this ship, and the experiments called for some alterations in her design. My job was to wring her out bone dry. I was to test first for design speed (that velocity at which the structure will not deform in any way), and secondly for structural strength (to determine whether the aircraft would withstand maximum G's).

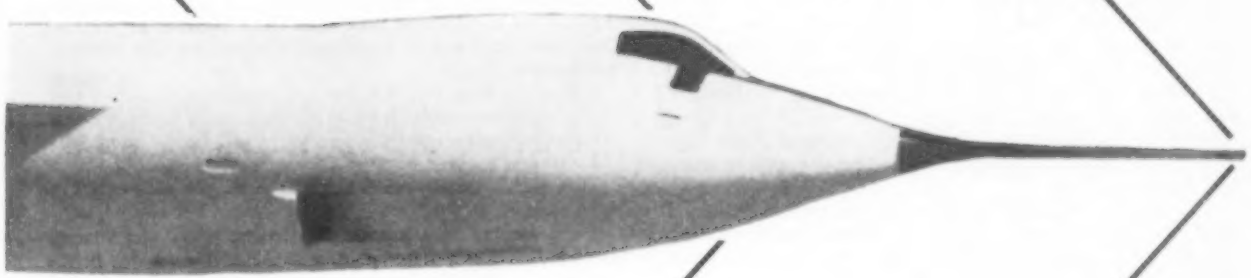
In other words, they had to know if the ship would hang together and be fully controllable through a design speed dive and pullout.

I soon got the answer. About midway between Long Beach and Santa Ana I pushed over from 17,000 feet and poured the power to her at about a 20° angle—sufficient for the speed required.

At about 9,500 feet I had reached the required speed,

The famous test pilot of the Skyrocket, second man to attain supersonic speed in straight and level flight, sums up a sensational career.

By GENE MAY
as told to
GUY HALFERTY



MY BIGGEST THRILL

A terminal dive in a Douglas A-26 gave May the closest shave of his long career.

so I started to pull her out. Trouble. She wouldn't come out. Worse than that, she started to *nose under*. She now increased her dive angle, steeper and steeper, to about 65°, despite everything I did to counteract.

I pulled violently on the wheel, bracing my feet against the instrument panel. The harder I pulled the more she wanted to outside-loop. I cut the throttles (she was already far over maximum design speed specifications) but that didn't help.

The ground was coming up at me faster and faster. I said my silent prayer, the one I always use at ticklish times. I was running out of altitude. By this time, I was pulling with all the strength I possessed.

At 2,000 feet, in last-second desperation, I shoved full ahead on throttles and prop controls. It worked! Slowly, she nosed up, engines screaming from excessive rpm's, and came out of the dive, flattening me to my seat like a wad of bubble gum. I made it; but it's a cinch some Orange County citrus grower had all his fruit picked free that day by one screaming A-26.

The experimental alterations the engineers had made in design had drastically changed her control characteristics at design speed. After that one near-fatal dive (the closest shave I ever had) they scrapped that alteration and approached their problem from a totally different angle. The next time I tested that ship she worked like a charm.

There is a lot of misinformation about the straight-down, or terminal velocity dive. (Terminal velocity is the absolute maximum speed at which an object of given size and weight will fall.) Ordinarily, terminal velocity dives are all in the day's work for a test pilot. You make them not because you like to feel your ears twang and the blood drain down around your hip pockets during pull-outs, but because the Navy (or whoever your company builds for) wants absolute proof the ship won't come unglued under maximum stress. To the test pilot, diving is only one phase of a long series of tests.

Diving can get you into some weird fixes, however, because it does deal both pilot and ship the greatest punishment. One day an odd thing occurred when I was doing structural dive tests on the Douglas AD-1 *Skyraider*, since accepted as the Navy's standard dive bomber, and in my judgment one of the most versatile airplanes ever built.

On this particular day I was testing to see how she liked diving with two torpedoes hanging under her wings. At 30,000 feet I rolled her over into a 90° dive—straight down—with full power on. She had just about reached the terminal velocity required by the Navy when—wham! —the canopy popped open two inches. The terrific change in air pressure temporarily blinded me. I pulled out of the dive at 7-G's. Hot hydraulic oil from a broken forward line started flowing over my clothes, and the cockpit filled with smoke as oil poured on the hot engine.

When I leveled off, my fix was still bad. I couldn't get the canopy open or closed. I was trapped with blinding pressure on my eyes, the choking smoke, and the hot oil bath. With this lovely combination I could hardly see a thing.

I was still 70 miles from Los Angeles Airport. Somehow I got her back; but with my broken hydraulic lines I had to hand-pump the landing gear down, using an emergency oil supply. We found out what we went after: that a change was necessary before the hydraulic system could survive terminal velocity dives and pullouts, as would be necessary at times in actual combat.

Still on the subject of oil, the worst predicament it ever got me into was during the testing of the Douglas TB2D. This was a 20,000-pound torpedo bomber powered by an experimental engine with counter-rotating props. A ship with the same propeller mechanism had previously failed on Howard Hughes and caused him to crash in Beverly Hills. This mechanism was extremely difficult to perfect. Only now, on the A2D *Skyshark*, is it getting into military production.

I was cruising at 4,000 feet on routine tests when my flight engineer, in the back cockpit, called me on the intercom to tell me he was suddenly swimming in oil.

I checked my instruments. "Oil pressure is o.k."

"Pressure, shmessure!" he shot back. "I tell you I'm drowning."

I got excited in a hurry. No telling what was wrong, but evidently it was something major. The oil was flowing out the breather pipe and running back through the fuselage.

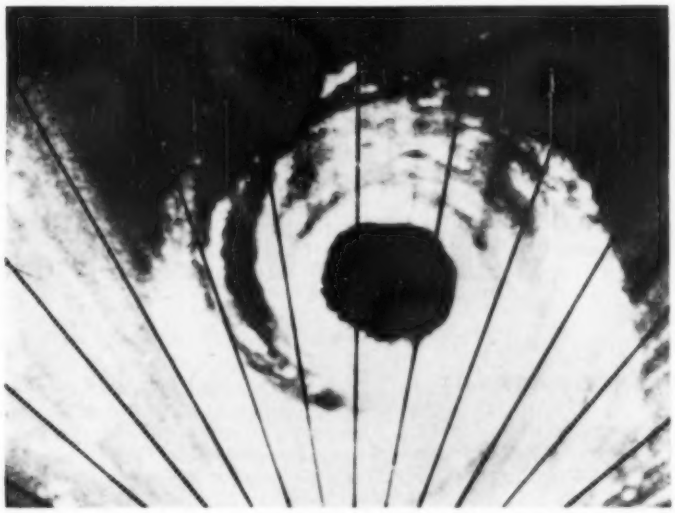
Just then, the worst possible news: the oil pressure dropped off to zero. I put the ship into a steep glide for Long Beach airport, alerting the tower for an emergency landing. How long could a 3,500 hp engine keep going with the oil draining off at full flow? Minutes—no more. I didn't dare kill it; I would need power for a sure landing. But if the engine froze tight from lack of oil—there we'd be, two skinny guys with two very large and very dead propellers and one 20,000-pound airplane, with no possible chance now to bail out.

Three minutes later (it seemed like half an hour) I came in on a fast approach over the north-south runway which (I thought) had been cleared for the emergency. I let down to land. Suddenly, a ship below me started to take off on the same runway! Balked, I turned 45° left, preparing to crash land on the sod if necessary. Balked again: two parked B-17's directly in my path.

Miraculously, my sick engine was still turning over at idling speed. I made another 45° turn, now only 75 feet above the ground. The airport passenger terminal now loomed up dead ahead, and behind it, across the boulevard, the Douglas parking lot. That was out! I banked again, and—praying that the engine would hold together a few more seconds—gave her full throttle.

I turned about another 120°, slipped over the big Douglas hangars by inches, side-slipped on in and finally contacted the ground, wheels down, just as the engine froze up tighter than a salesman's handshake. When we got out and inspected our engine there wasn't enough oil left (out of the original 50 gallons) to slick down your hair.

When the experts later inspected the damage, they found that the complicated gear train in the nose case had broken down. The chunks (*Continued on page* 51)



The perfectly formed "eye" of a typhoon is shown in this radar photo taken in a reconnaissance plane when the center of the storm was 120 miles from Okinawa.

Typhoon at Oke

Okinawa-based bomber crews do some of their toughest "flying" without ever taking off.

By ROBERT B. PARKE

"KAREN" was due in an hour. On Okinawa, everything was ready. Small buildings were lashed by cable to the ground and larger ones braced. Doors were reinforced and windows barricaded. Light planes were dismantled and stowed. The island was battened down. Everyone waited uneasily. "Karen" was a typhoon, raging straight for the Air Force's main Pacific outpost.

In the briefing room, crews for the combat bombers received final instructions. The weather officer finished with the warning that the wind might go as high as 150 knots and the destructive force of the blow would probably last more than 24 hours. The crews filed out and headed for the line of trucks waiting to take them to their planes. The time, 1100 hours. And a typhoon called "Karen" was due in an hour.

Outside it was dark. A charcoal gray ceiling hovered at 300 feet and scud slipped by underneath. An uncomfortable stillness muffled miles of narrow, dragon-curved island and extended to the clusters of satellite islands off the irregular shoreline. Now and then a rain squall twisted erratically across the hills.

The trucks dumped a pilot, co-pilot, engineer, radio operator and scanners at each B-29, then scooted for the shelter of the motor pool. Aboard the planes engines turned over and each ship crawled out to an assigned position on the taxiway, spaced well away from its neighbor.

The control tower broke in: "All planes pick up 235 degrees." Each of the giant craft angled around to the heading. With controls unlocked, engines cut, brakes set, they waited.

Barring combat, there's not a tougher mission for the Okinawa-based bomber crews of the 20th Air Force than flying out one of the Pacific's typhoons. It takes daring—when fierce winds threaten to rip the planes apart. It takes endurance—when crews have to sweat it out for as long as 60 hours; and it takes flying skill—though the huge planes never leave the ground.

The mission is to bring the bombers through and ready for immediate action once the typhoon's paralyzing force has passed. This is accomplished by keeping the ship on the ground, under control, and always headed into the gale's teeth. Meanwhile, it's the control tower's job to call wind changes to the grounded ships and to flash the cue to start engines when the velocity climbs to more than 80 knots—the ships' take-off speed.

When this critical point is reached, each plane is literally being flown into the ground with power balanced to meet the storm. The wheel and rudder are unlocked, forcing the pilot and co-pilot to absorb the punishing effect of treacherous gusts lashing the controls. As the tempo of the storm builds, each crew becomes as isolated as if it were a thousand miles away, for if anything should happen rescue would be almost impossible.

Before the perfection of the "typhoon mission," a dozen ways to keep the bombers combat-ready had been tried. All but the traditional "fly away" had (*Continued on page* 44)

Stripped, with gear collapsed, and heavily weighted down with sand bags, this T-6 of the Twentieth Air Force is prepared to ride out a typhoon at Okinawa. Plane rests on truck tires; trucks form protective circle around planes.

A Sheepskin—Then What?

By LAWRENCE FARRANT

Now you want a job. During four years you've been reading textbooks . . . working out equations . . . stewing over stresses . . . or molecular structures . . . or vacuum tubes. Now you're ready to earn a living.

MEN, I got the word. It didn't all come in one piece. Instead, it came from everywhere—Detroit, New England, California, Texas and Pennsylvania—north, east, south and west.

Here it is: There'll be plenty of jobs waiting in the aircraft industry when you toss the sheepskin in your new luggage.

Suppose we start with elementals. Then we'll get down to details.

Basically, it's this: The aircraft industry is hot. Anybody who wants a job, unless he's a bum or a subversive, can have one with a pretty good pay check.

Fact is, the big corporations are worried about not having enough engineering graduates to go around this June. Worried? That's putting it mildly. T. A. Marshall, Jr., Executive Secretary of the Engineering Manpower Commission of Engineers Joint Council, says: "Right now there is need for 40,000 new engineering graduates for industrial and civilian governmental jobs alone, without considering the needs of military services or education. On the other hand, engineering graduates will total only an estimated 23,000 in 1953; 19,000 in 1954; 22,000 in 1955; and 29,000 in 1956.

It's not as if this problem had just arrived. It was first foreseen in the depressing '30's. There weren't enough babies born in those days. So today there aren't enough young people in their 20's to fill all the opportunities for Americans in that age group. Consequently, statistically speaking, the job outlook for this June's graduate is bright.

But, you may ask, what about predictions of a recession sometime around mid-1953? Will this mean that you are getting your diplomas too late?

The answer is easy. There's not going to be a recession in the aircraft industry.

The reason: Uncle Sam needs airplanes so long as there's a need to make this nation secure. There are contracts running for several years ahead to keep the industry humming at capacity and even expanding to assure the most modern aircraft for our military forces.

What about the rest of the United States? Will it go into an economic decline? Most of the experts are forecasting a bit of a dip, but they've been wrong before, plenty.

The stability foreseen for aircraft production, by comparison, makes a career in this field ideal for men just leaving school.

Back in 1950, 3,000 military planes were produced in the United States. In 1951 the figure was above 5,000. Last year, about 9,000.

Scheduled for delivery are 20,000 more. Delivery schedules have been stretched. Instead of all of them planned for late 1954, they're to be ready by early 1956. Because the industry devotes 95 per cent of production to military needs, it's obvious that a great many people will have to work on the 20,000 planes between now and January, 1956.

Last December, according to Admiral DeWitt C. Ramsey, USN (Ret.), President of Aircraft Industries Association, 750,000 were employed by the industry's firms.

Admiral Ramsey added: "Activity in the aircraft industry will continue to accelerate. To carry out its obligations, additional employes will be required, with the labor force continuing to rise beyond the 800,000 mark during 1953."

He went on to forecast that even if budgets for 1954 are reduced, it will not affect the industry's activities this year.

So, if you're looking for a job that's going to last, plus a chance to show what you can do, plus excellent chances for advancement, plus a wide choice of places to live, you should send out resumes to the firms listed hereafter.

It shouldn't be necessary to outline how to write a resume. Just remember to tell the company what you think you'd like to know if you were hiring someone. You don't have to repeat all the grades you made—an interested company will require a transcript—but you should mention some of your special laboratory reports that would fit into industrial patterns. Give the personnel

manager a clue to your personality. Will you make a pleasant associate after working hours? For instance, hobbies: do you golf, play bridge, go in for campus politics, hold a reserve status in the military, write scientific articles, invent gadgets, like to travel, take photographs, teach Sunday school, lead Boy Scouts, chop wood, dance with tri-Delts, sing in the shower, or grow a beard?

If you're married, say so. Practically every firm would like to feel it's taking on a man with the "matured" views acquired through matrimony. In addition, most of them feel that a smart girl might even be induced to work in the office while husband is at the plant.

Now, on to details gathered as examples from various areas:

Allison Division, General Motors Corp.

Allison Division wants to hire a minimum of 200 engineers graduating this year. Some openings are expected also for a limited number of seniors with mathematics majors and with business administration degrees.

Minimum starting salaries are $289 a month, plus cost-of-living allowances averaging $41 a month. At the end of six months there's an automatic increase of $15 a month; at the end of the first year, another $15 a month increase.

Applications should go to Personnel Manager, Allison Division, General Motors Corp., Indianapolis 6, Ind. Housing and cost of living around that city are about average.

Aviation Gas Turbine Division, Westinghouse Electric Corp.

George R. Northrup, supervisor, technical employment, says: "There will be an increasing number of openings for all types of engineers, physicists, metallurgists and chemists to conduct routine as well as highly theoretical investigations involving the design and performance of our gas turbine engines. In addition, there will be a need for mathematicians, technical writers and draftsmen."

Salaries at Westinghouse will range about the same as at other aircraft engine companies. Promotions are made within the ranks as a matter of policy.

Housing and living costs in Philadelphia compare with those of other cities of similar size. Applicants should write to Mr. Northrup, Supervisor of Technical Employment, Aviation Gas Turbine Division, Westinghouse Electric Corp., Lester P.O. Station, Philadelphia, Pa.

Boeing Airplane Co.

Boeing wants every type of engineer: civil, architectural, industrial, mechanical, electrical, agricultural, construction, ceramic, tooling, electronics, communications and just plain business majors. Generally speaking, military experience is considered valuable when applicable to the job. Aircraft mechanics is a typical example.

Salaries begin at $320 a month and up. In addition to paying moving expenses, Boeing offers sick leave, vacations, periodic merit interviews and merit promotions.

Send your application to Personnel Manager, Boeing Airplane Co., Seattle 14, Washington.

Curtiss-Wright Corp.

Leo E. Sweeney, manager of engineering recruitment, Curtiss-Wright Corp., anticipates hiring more than 100 men receiving their engineering degrees this June. He says supplies of engineers is about half the number needed.

Starting salaries vary widely, depending on background of the applicant. Credit is given, in arriving at the starting salary, to military aircraft experience. Advancement is based on merit.

And here's a good bit of news. Mr. Sweeney says, "Housing is plentiful around Wood-Ridge, N. J."

Write to him at the company in Wood-Ridge, N. J.

Douglas Aircraft Co., Inc.

Go to lovely Santa Monica, Calif., and live and work like an engineer, top man on the totem pole, says Douglas.

Douglas needs engineers and scientists. They'd like to hire 1,320 of them. But they know they haven't a chance to get that many. The firm will pay $1.90 to $1.95 an hour, $328 to $338 a month, for a 40-hour week. At three plants, engineers send in paycards for 45 hours average. The other runs 43 hours on average.

About 65 colleges will be combed for engineers to work for Douglas.

The man to write to is C. C. LaVene, Employment Manager, Engineering Division, Douglas Aircraft Co., Santa Monica, Calif. He wants majors in aeronautical, mechanical, electrical and civil engineering, plus mathematics and physics majors.

Fairchild Engine and Airplane Corp.

H. R. Perham, Employment Manager, reports he needs engineering and technical personnel to fill openings this year. Some consideration, salary-wise, is made for experience with military aircraft, and the outlook for advancement is good.

The company will visit schools on the East Coast, in the South and the Midwest. If you're from another area, send your resume and application to Employment Manager, Fairchild Aircraft Division, 806 Pennsylvania Avenue, Hagerstown, Md.

Glenn L. Martin Co.

Here's a charming town, Baltimore, Md., with very reasonable rentals, both furnished and unfurnished. The work includes a diversified program involving research and development in electronics, electro-mechanical and structures. The company makes missiles, rockets, sea planes, and land planes. J. J. Krajovic, employment supervisor, expects to hire 175 June graduates in engineering. Starting pay is around $320 a month.

Send your resume to Mr. Krajovic, Technical Employment, Glenn L. Martin Co., Baltimore 3, Md.

Kaiser-Frazer Corp.

New aircraft production programs, adding an assembly line for Chase C-123 ships to the already-established line of Fairchild C-119-F aircraft, will create plenty of jobs at Willow Run, Mich. There are also likely to be openings at K-F's engine programs in Detroit and Dowagiac.

Seniors from schools outside Michigan will have to put in their bids for engineering positions. The company limits its visits to colleges in the (*Continued on page* 62)

Purchase Pains

From his own abundant experience, the buyer of a second-hand aircraft sets down his recipe for a satisfied customer.

By F. E. NORWOOD

PERHAPS it comes to many fathers whose sons join them in business—the day the son brings up the subject of buying an airplane to be used in the business. It happened to me, and for several years I resisted the proposition.

It seemed foolish to me, with good automobiles available and good roads connecting all localities, to invest in an expensive piece of equipment like an airplane. I maintained that every dollar invested in the business must show a profit, else why invest? About that time, however, I was literally wiped off the road by a large trailer truck twice within one month. This had a weakening effect upon my resistance.

Since my son had six years' experience in electronics with his Uncle Sam, he was entitled to training in a school which taught flying, so he began spending his spare time out at the airport learning to be a bird. He finally passed all the examinations and was given his pilot's license. Promptly he started flying anything he could get his hands on that had wings, or a reasonable facsimile thereof. He talked flying all day and night. He took everybody for a trip skyward who would go with him, except his mom and dad. Now don't get me wrong. I didn't feel rained on, because I really didn't want to go. I wasn't afraid, but I didn't want to become interested in something that I did not think we could afford.

Finally the day came. We had a special trip of 200 miles to make and were in a jam for time so we decided to take the plane. My son arranged with a local flying service to have a plane ready for us next morning and we took off about 6 a.m. It was a bright, sunny morning and as we were airborne my son mentioned that the air was as smooth as glass.

We were using a two-place Aeronca *Champ* and flying about 90 mph. Everything seemed O.K. until some clouds started to appear and thicken up and then it began to rain. I was looking down at buildings hoping to find the name of the town painted on a roof so that we could get our exact bearings. About this time I spotted a line of clothing that was standing straight out. That was when I realized that we were not only being rained on, but also being blown about.

We had no radio and the clouds continued to close in, until it seemed we were having to fly not more than 500 feet from the ground. It was really getting rough and there didn't seem to be an opening anywhere. When we finally found our location, we found that in trying to fly around the storm we had drifted 30 miles off course.

About this time my son mentioned that he thought the best thing to do was to make a 180 and start for home. I knew that this must have been a blow to him, as this was my first time up with him. For the weatherman to do us this way was almost unforgivable. From then on, he had little to say. I was inclined to be rather quiet, too. I was looking around for a possible opening through which to hang my head. I didn't know that one's breakfast could become so undecided.

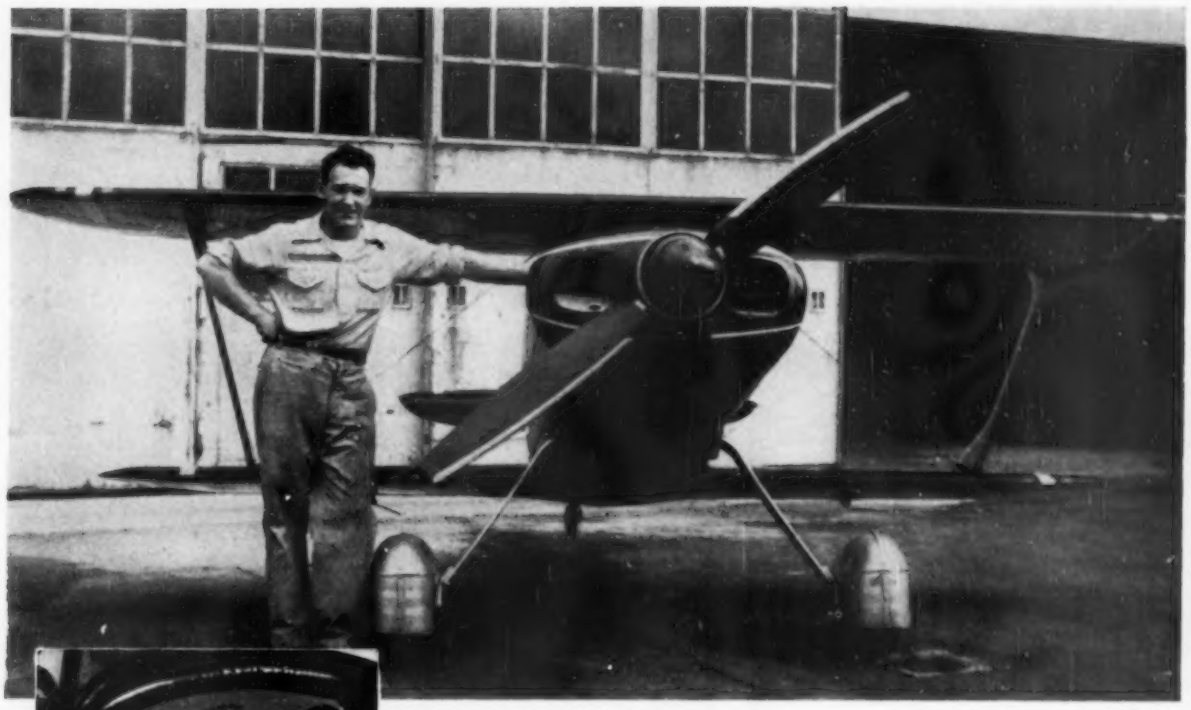
We finally came to an airfield and made a perfect landing and the weather at the field was nice. Getting my feet on the ground for a few minutes seemed to have an arresting effect upon my stomach and so, after taking on gas, we again took to the air. We were now only 30 minutes from home, but the air was still rough and by the time we landed at home base, I felt that I had won a notable victory. I didn't have to clean the ship.

My son thought I would be down on flying now but on the contrary that experience really sold me on flying. We had to make the trip by automobile that same day and found that the weather at our destination had been fair all day. With a radio, we could have continued to our destination. I realized, too, that if a ship is properly handled, it isn't going to fall apart in midair as some would have you think.

To my son's surprise, I agreed to finance the purchase of a good plane, if one could be obtained cheap enough. We would give it a trial and, if it worked out, we might get something better. We rode in crates of many colors, makes and conditions, but the ones that suited my pocketbook didn't measure up mechanically.

About that time my wife decided that if we were going to get a plane we should get one large enough so that she could go along. This meant a four-place ship, in order to allow enough room for the three of us, a few tools and (*Continued on page* 63)

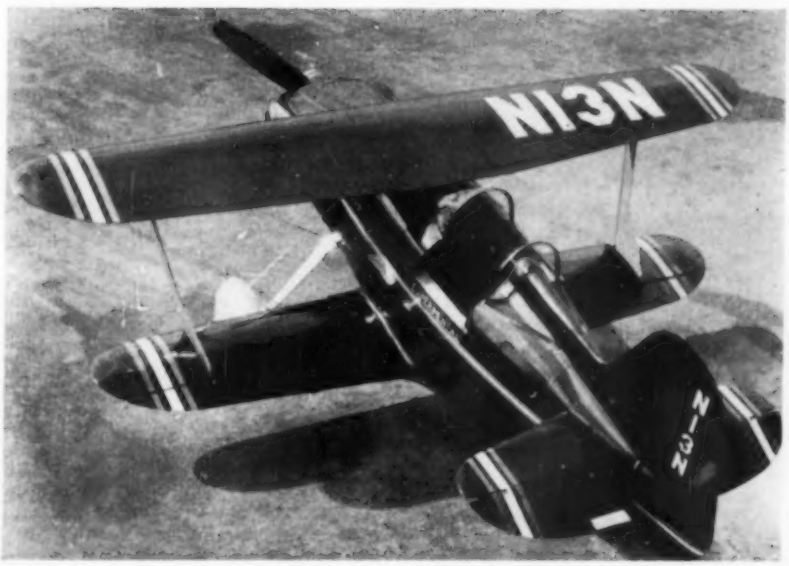
Mr. and Mrs. F. E. Norwood, their son R. Ronald, and their hard-earned Piper *Pacer*.



Above is Louie Lowery, affording a general idea of the overall dimensions of the *Knight Twister*. Most of the construction was done by Lowery and Merritt Roakes. Instrument panel is at left.

By RICHARD I. DAVIS

Knight Twister



An overhead shot of the *Knight Twister*, before a modification of the cowling was undertaken.

ALTERED considerably from the original plans by Vernon Payne, the *Knight* Twister built by Louie Lowery and Merritt Roakes at Sky Harbor, Me., has the most powerful engine known to be used in any *Knight Twister*.

An Aeromatic air-controlled propeller powered by a Lycoming 0235-C1 stepped up to develop 125 hp gives the plane a cruising speed of 165 mph. It has flown over 200 mph.

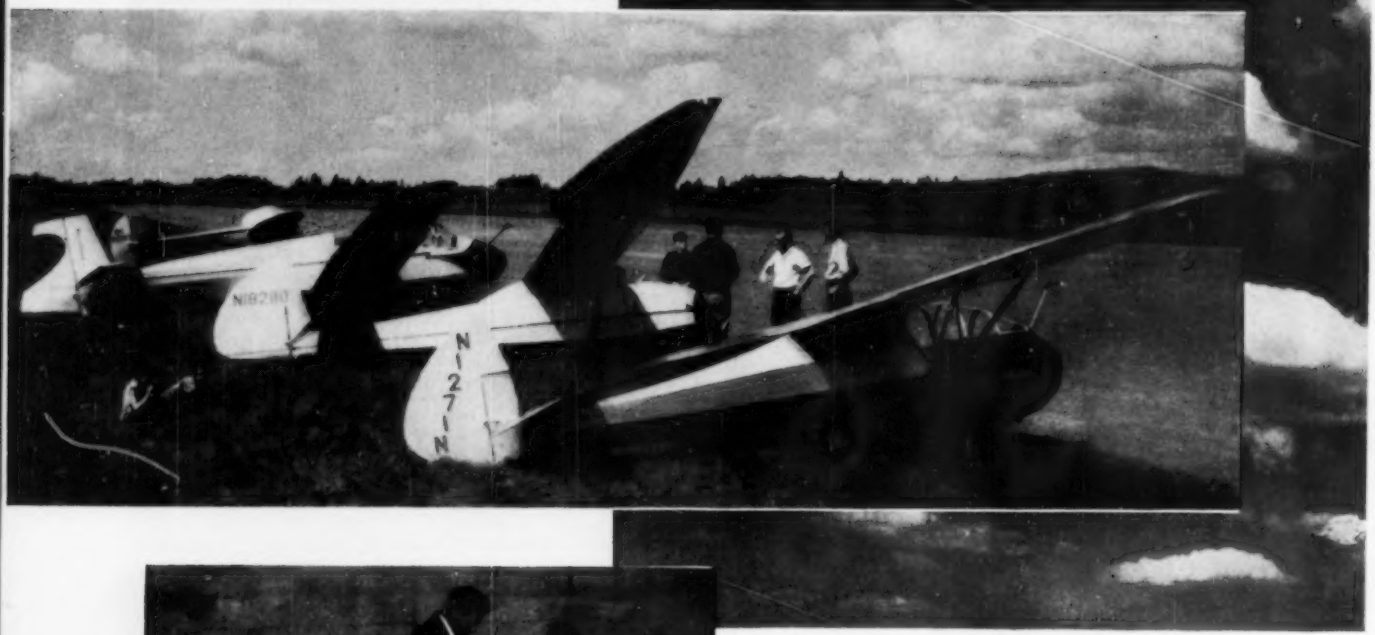
Requiring a 300-foot take-off run, the ship climbs at a rate of 1,800 feet per minute, lands at 85 mph. Lyndall Roberts of the Brunswick Flying Service has made numerous flights in this *Knight Twister*.

Financed and owned by Henry M. Dingley, Jr., operator of Sky Harbor Flying Service, the plane made use of no prefabrication in its construction. Cost for engine and parts alone is estimated at approximately $2,500. Built-in trim tabs, all torque-tube controls and spring steel landing gear are some of the features incorporated in this particular *Knight Twister* model.

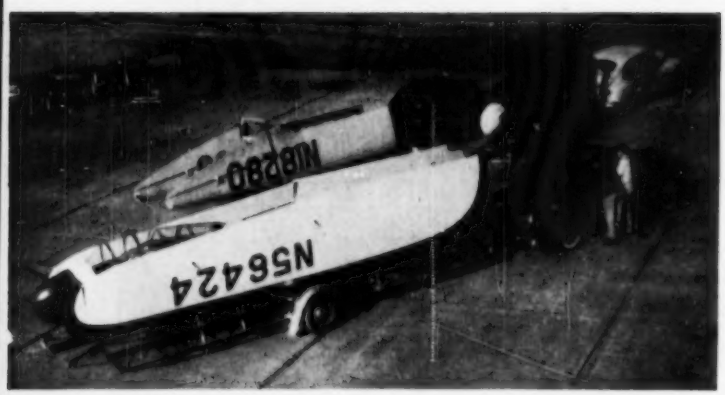
The ship required two years' spare time in construction and is finished with 35 hand-rubbed coats of finish.

Other specifications are: wing area—55 sq. ft.; wing loading—over 16 lb./sq. ft.; wing span—15′ top, 13′ bottom; length—14′. END

Sailplanes of the Seattle Glider Council line the runway of the Gliderport at Arlington, Wash., during a "Soaring Weekend." Front to rear are a Briegleb BG-6, single-seater built from a kit; a German-designed Goppingen *Wolf*, medium-performance single seater; a war surplus Schweizer TG-3A two-seater and, at the rear, a two-seater postwar design known as a Nelson *Dragonfly*.



At left, members of the Cascade Soaring Society of Seattle cooperate in assembling a Briegleb BG-6 from a kit. Gliders are well suited to club construction programs. *Below*, gliders disassembled for hauling by trailer. Gliders can be quickly assembled and disassembled for easy transport and for storage in winter.



SOARING is sport in its purest form. From the pilot's point of view, there is nothing to equal it. The usually voluble pilots, who can describe anything if they have both hands free, are at a loss to answer skeptics who ask, "What do you get out of it? All you do is go up and then come right down again." Boiled down to that, it does sound like a waste of time; but so do a great many other individual-participation sports.

Words cannot describe the exhilaration of finding and staying in the center of those invisible columns of air called thermals, and gaining altitude steadily on silent wings; nor can they express the immense satisfaction and sense of accomplishment that well up in a pilot as he lands his unpowered ship at a predetermined goal a hundred or more miles from his starting point.

Soaring as a sport should not be compared with the semi-military training programs now in operation in Iron Curtain countries. As an American sport it is necessarily exclusive, since the entire expense of the operation and the equipment is borne by the participants without benefit of subsidy, commercial tie-ins, or gate receipts at the frequent contests. The very nature of the operation is responsible for this last item. The spectator appeal of most glider contests is about nil, since the main idea of every pilot is to get as far from the scene as he possibly can. Few, if any, ships are in sight an hour after competition has begun. Spectator appeal is strong, however, in routine flight sessions, provided they are not held in a

SILENT FLIGHT

Flying reserves its supreme sensation for those who soar on wings of the wind.

By PETER M. BOWERS

The author in a Schweizer TG-3A, a 1,200-lb. war surplus two-seater with 54-foot wingspan.

locality that is too remote.

No other sport, except sailing, can approach soaring in matching a pilot's skill and judgment against luck in the form of prevailing weather conditions. So similar are these two sports that the higher performance gliders are called "sailplanes," and rightly so. As in sailing, the skill of the skipper, aided by the three-dimensional freedom of flight, can do much to overcome a competitor's advantage in equipment.

Mainly because of the personal skill element, soaring is an individual sport, and competition is always between pilots. Even the Bi-annual International contests are held to determine champion pilots, and not winning teams or nations. At present, six degrees of solo piloting proficiency are recognized by the Federation Aeronautique Internationale (F.A.I.), through the awarding of badges by the affiliated National Flying Clubs or other recording bodies of the various countries.

The first of these, the "A" badge, a single white gull on a circular blue field, is given for accomplishing short flights and 90° turns, generally in primary-type gliders from shock-cord launch. The "B" award, two gulls, is for flights including a 360° turn. These first two stages, along with the primary glider, are largely ignored in this country at the present time.

Recognition of actual soaring ability begins with the "C" award of three gulls, which is given for a sustained flight of five minutes above the point of release. A five-minute flight is not necessarily a soaring flight, as it generally takes at least that long just to get down after releasing at 1,000 feet from an auto or winch launch. After this award, things get harder. The Silver "C," the "C" badge with a silver wreath around it, requires a gain in altitude of 3,200 feet, a cross-country flight of 32 miles, and a duration of five hours. The odd figures come from the conversion of 1,000 meters and 50 kilometers to English measure, as these awards originated in Europe.

Gold "C" requires an altitude gain of 9,800 feet and a distance flight of 186 miles. Getting towed to high altitude and coasting is out, for the altitude lost below the release point must not exceed one per cent of the distance travelled. Before that rule was adopted, the Russians set a lot of distance records by airplane towing to 20,000 feet before cutting loose.

The newest award, established in 1947, is the diamond "C," which adds one diamond to the gold "C" badge for each leg accomplished—altitude (*Continued on page 56*)

IF YOU CHECK IT...

YOU WON'T WRECK IT!

A pilot who learned the tough way shares his hard-won wisdom.

By FRANK L. HARVEY

I'M GOING to ask a simple question. When you rent an airplane for a spin around the field—or when you roll your own plane out of the hangar to make a cross-country—what do you do in the way of checking it prior to take-off? Be honest now, and think, before you read further.

I'm willing to bet that most of you look at the gas and oil, rev up and check the mags and the carb heat, and let it go at that. Because I don't think this sort of check is good enough, I've pasted an itemized check-off list in the cockpit of my *Supercub* 125. In a minute, I think you'll understand why I'm sold on it.

The list is as follows:

1. *Walk-around visual*
2. *Oil supply*
3. *Drains—wingtanks and gascolator*
4. *Fuel supply, caps tight*
5. *Mixture full rich*
6. *Trim neutral*
7. *Flaps off*
8. *Start engine*
9. *Oil pressure*
10. *Oil Temperature*
11. *Primer knob secure*
12. *Magnetos*
13. *Carburetor heat*
14. *Full travel all controls*

This list may seem long. Actually it speeds up a take-off because it eliminates all mental effort. Just run down it with a fingertip, performing the various checks, and the routine is finished in a few moments. Furthermore, you can take off with real peace of mind because you *know* you haven't forgotten anything.

In case you think all this is silly, let me tell you a few things that have happened to me recently. About 100 miles east of Albuquerque my engine began to act up. The rpm's fell from 2,300 normal cruise to 1,900, bounced to 2,100 . . . then back to 2,300 . . . then sagged to 1,900—and kept doing this. Below me were chunky low buttes, eroded mesas, and route 66, which was chockablock with whizzing traffic. Frankly, I was scared. When an engine acts like that, you can't tell what to expect.

I climbed to 9,000 on the assumption that the higher I was the better off I'd be if the engine quit cold, and stuttered and bucked into Albuquerque through the mountain pass. The mechanics immediately diagnosed the trouble as water in the wing tanks. They pulled off the access plates under the two wing tanks and unscrewed the solid plug in each tank. Sure enough, out gurgled a large quantity of clear water, plus a lot of grit, dirt and other muck. Finally the clear pink stream of gasoline appeared.

The mechanics installed quick-drain valves in each wing tank, leaving the access hatches off, and instructed me to draw off a few ounces of gasoline each time I had the tanks filled. This way, they told me, I'd keep the tanks permanently clean and free from water and grit. I have done what they recommended, and I frequently get small amounts of grit and water, so I know it was good advice. The water, of course, comes from condensation. It collects in the low part of the tank, where the drain valve is located and, in gusty air, sloshes around and gets into the feed line which leads to the carburetor. If enough of this water rushes in all at once, it could conceivably make the engine quit completely. I think quick-drains under the wing tanks are an investment that everyone could make—just to be on the safe side. The drains are cheap and very easy to install.

When the time came to leave Albuquerque I was so relieved to have found my difficulty that I didn't bother to make my usual walk-around visual check of the airplane. The mechanics, in addition to installing quick-drain valves in the wing tanks, had removed my quick-drain bowl on the gascolator, cleaned it, and replaced it. I cranked up, took off, and flew some 350 miles non-stop to Prescott, Ariz., over some of the grimmest country I've seen—rocky summits, vertical cliffs, yawning chasms—a place where you couldn't have made a good forced landing with a helicopter. I hangared the plane and went into Prescott and spent the night, but the next morning, when I came out to take off for Las Vegas, the mechanic called to me: "Come here a second. I want to show you something."

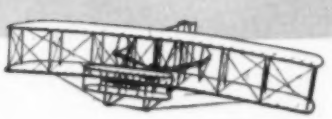
We squatted down under the engine and he pointed to my gascolator bowl. The wire arm-clip which holds the bowl in place was all whopper-jawed. One end of the clip was securely sunk in its socket. The other end of the clip was completely out of the socket—hanging by the barest edge of metal—on the opposite side of the gascolator bowl. The mechanics at Albuquerque had not seated it properly when they replaced the bowl after cleaning it.

"You know what would have happened if that clip had slipped off, don't you?" the mechanic asked.

"Yes," I said. "The engine would have stopped getting fuel and I'd have had a forced landing."

The mechanic grinned. "That wouldn't be healthy in these parts—particularly between here and Las Vegas. I can't understand how the thing stuck there, with the wind pressure and the vibration and all. You ought to pay attention to these things." (*Continued on page 58*)

Genealogy of American Aircraft



Carrier planes, scout and attack types, amphibians— Grumman's growth has been along three parallel lines.

By GILL ROBB WILSON

THE Grumman family tree is the subject of our second graphic presentation in a continuing series entitled: "The Genealogy of American Aircraft."

During 23 years since formation of the Grumman Aircraft Engineering Corporation, some 22,000 planes have been produced by the company. As the chart shows, these have been in three main categories: (a) shipboard fighters, (b) scouting and attack types, (c) amphibians. Additionally, during World War II, 13,500 Grumman-designed planes were produced by General Motors.

The FF-1, progenitor of the brilliant Grumman fighters, was the world's first successful military plane with retractable landing gear, and 20 miles per hour faster than any fighter of its day.

The F4F *Wildcat* was Navy's standard fighter at the beginning of World War II. Combat experience led to several versions of the F4F and one of these, the F4F-8, was the prototype of the FM2's produced by General Motors. The F4F's folding wing was the first of its type.

Succeeding the F4F's by the end of 1942 came the F6F *Hellcat*, the plane which destroyed two-thirds of all enemy planes accounted for by Navy and Marine airmen in the Pacific. The design and production schedule of this aircraft was acclaimed throughout the industry as unexcelled. In direct line from the F6F came the F8F *Bearcat*, a phenomenal performer at low altitudes. Active still in Korea is the F7F *Tigercat*, a twin-engine day-and-night fighter of the Marine Corps.

With advent of gas turbine propulsion, Grumman designed the F9F *Panther* which became the first Navy "jet" to see combat. Its successor, the current Grumman production fighter, is the F9F-6 *Cougar*, to be followed in turn by the still secret XF10F-1.

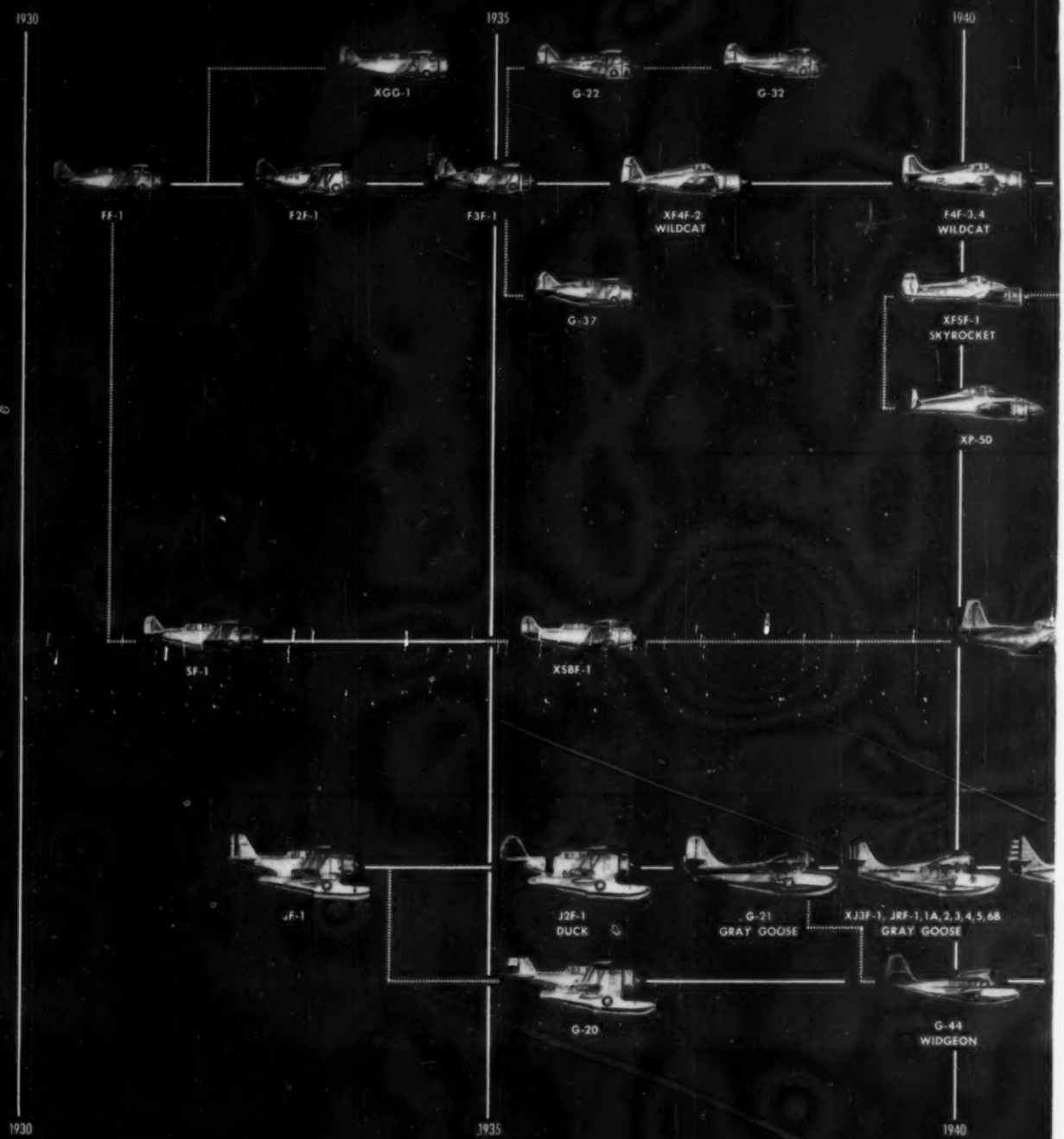
The second main division in Grumman's genealogy is a line of scout planes, torpedo bombers and attack types. As the *Wildcat* made its famous stand at Wake, so did the *Avenger* at the Battle of Midway. Duplicates of this plane produced by General Motors were known as TBM's. Developed from *Avenger* experience is the series of the AF *Guardian*.

Seed for the amphibious branch of the Grumman family tree was the JF-1 whose successor, the J2F, remained in production by Grumman or other companies until 1946 . . . an unusual production span for any plane design.

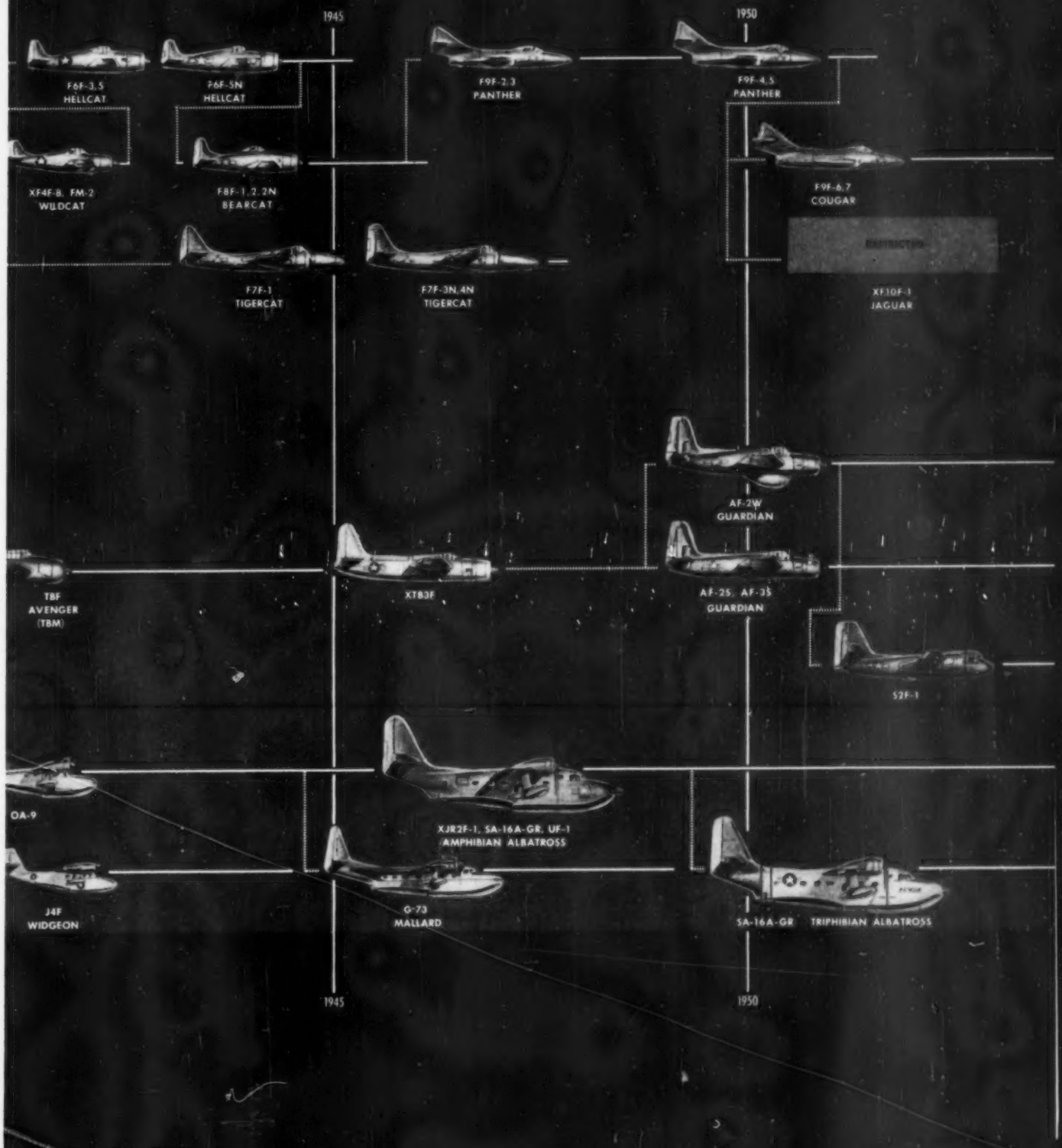
Grumman's first twin-engine amphibian, the G-21 *Gray Goose*, was marketed widely for civilian as well as military use. It held the international speed record for amphibians in 1939. A smaller popular amphibian, the *Widgeon*, likewise originally was designed for commercial use but found military utility as well. The *Mallard* joined the Grumman family at the end of the war and is currently in popular demand as an executive type plane.

Latest of the line is the triphibian *Albatross*, able to land on ice and snow as well as earth and sea. Credited with a notable rescue record in Korea, the *Albatross* is used by all military service branches. END

Genealogy of Grumman



American Aircraft



Above is an air view of "Happy Valley," as seen on a flight from Rabat to Meknes. This natural valley has been developed as a cool summer oasis complete with fountains, flowing streams, fantastic rock gardens and waterfalls. Surrounding countryside is very hot in summer.

Above is a shopping section in Medina, the native portion of Rabat. The tower in the rear center is a Moslem mosque. *Below*, a water-wheel, one-camel-power, on a road near Mazagan. Note blindfold.

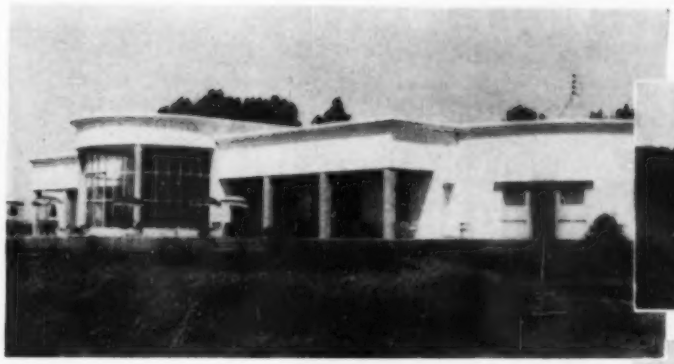
Private

By MONTY B. WALKER, Jr.

RABAT, the capital of French Morocco, was only a name in the geography books to 99½ per cent of all Americans until the late World War. The invasion of North Africa brought a relative few to its doorsteps and an even smaller few into the city itself. Now with the second invasion of Morocco, as it has been called, many more Americans are to be seen in the area.

Rabat has been an American headquarters of one kind or another since the construction people arrived about two years ago to start work on five airbases for the Air Force. First the Army's Corps of Engineers, charged with overall supervision of the work, set up an office pending establishment of a more centrally located headquarters near Casablanca. As they moved out, the Air Force came in with their Air Division Headquarters and the blue uniforms were soon all over town. For the first time, the "White Hats" of the USN, on pass from their nearby base, began to be outnumbered.

The city is the capital of the French Protectorate Government, which was established in Morocco in 1912. The city is composed of two different—but not completely separate—areas; the homes of the native Moroccans called the "Medina," and the remainder of the town, built up since the arrival of the French. The Medina is the



Above is the Aero Club of Marat's splendid clubhouse. *Above right* is the club-owned *Piper Vagabond*, and below it is a French *Norecrin*, 4-place plane with retractable gear, manual flaps, stick and 110 mph cruise. There's no chance to fool a lenient instructor during a flight test in Morocco. A recording barograph rides the co-pilot's seat.

flying in MOROCCO

Airport 5 minutes from town? Luxurious clubhouse? Sounds like a private pilot's heaven!

East; the homes are the homes the Moors have been building for a thousand years. Happily, the architects of the European section were able to combine the Moorish architectural ideas with those of modern Europe.

The first week I was in Rabat, while on an expedition dedicated to the search for quarters, I chanced to pass an area readily identifiable as an airport. There appeared at the side of the road a little arrow pointer which said, "Aero Club." I quickly found myself at the clubhouse.

The clubhouse of the Aero Club in Rabat is a fine example of what such buildings could and should be like. The street entrance opens on a turn-around for autos, with parking spaces at the outer rim of the circle. Inside the building there is a vestibule with corridors running right and left. At the far end of the corridor on the left, there is the business office and pilot's room, from which a doorway opens outdoors to the hangars. The corridor to the right leads to rooms fitted up for sleeping, usually occupied by one or more flight instructors or the club manager. If you walk straight in and do not take either the right or left corridor, you enter the central room and focal point for the building—a miniature edition of the main waiting room of the Terminal Building at Washington National Airport.

This room is large, circular on the field side, and with this side completely glass enclosed. The room is used for parties, dances, dinner, or just as a place to sit down and have a drink while enjoying the view of the entire field. To the right and left, doors lead to the ping-pong room and the bar, respectively; other doorways open on the outdoor terrace which extends all the way across the field side of the building. On the terrace there are a number of tables, complete with beach umbrellas—and cold beer, if desired. This an ideal spot in which to relax and enjoy the big outdoors with minimum effort.

Since my companion in this venture was an old hand in the use of the French language, we were quickly able to make our wishes understood. After we finished the beer, we made inquiries concerning the membership fee and similar basic information. We found that there were airplanes which could be rented, but one must first join the Club. Membership fee, payable annually, was 2,000 francs or a little over $5. Rental rates for the planes were found to be a little higher than in the U.S.—about $8.50 an hour for a Piper *Cub;* $9.50 for a Piper *Vagabond.* There was, and still is, only one other airplane available for rental—a four place French *Norecrin* which is about the size of a *Navion,* with re- (*Continued on page* 60)

Capt. Adickes at the controls of a *Super Connie*. Enlarged Nesa glass electronic windshield improves visibility by 40 per cent.

Hamilton-Standard automatic propeller synchronizer, new boon to the *Super Connie* flight engineer, is demonstrated by TWA Engineer E. L. Thornton. With one finger on the automatic button, engineer performs what is a 2-handed job on the standard *Connie*.

The pilot of a Super Connie scrutinizes his plane

and finds prospects bright for this fast, long-range airliner

and the forthcoming compound-engine version.

By ROBERT F. ADICKES

Captain, Trans World Airlines

A skipper looks at his ship

WE WHO make our living as professional pilots have an avid interest in the planes we fly. We live our lives in them day after day, year after year, under all conditions. Neither passengers nor government officials could possibly be as sensitive to the safety, comfort and capability of our planes as are we ourselves. So it is that our appreciation of good features is always keen and our criticism of things we don't like is always sharp.

Over the years I've read a lot of articles in FLYING Magazine entitled "check pilot reports." Usually they covered business and personal airplanes and I found them most interesting and helpful. It has struck me that pilot comment on some of the newer big planes would also be of interest.

Currently I am assigned to TWA's "Ambassador" flight which utilizes the *Super Constellation*. Having piloted 11 years for the line, nine years as a captain, I've naturally flown all models of the *Connie* since 1945. That should give me the background to speak with some pilot sense of evaluation of the *Super Connie*.

Like most good modern planes this one is the result of evolution in design and has a family tree behind her. The granddad of the *Connie* family was the model C-69 whose specifications were laid down in 1939 as a result of the joint thinking of the Lockheed management and Howard Hughes and Jack Frye of TWA.

In 1944, the first C-69 was flown from Los Angeles to Washington, D. C., by Hughes and Frye, who set a new coast-to-coast record of 6 hours, 44 minutes. We were at war then so the airplane was turned over to the Air Force. That speed record set eight years ago is hard to beat despite the many improvements.

Following the C-69 came the models 49, 649, 749, and the 749-A which immediately preceded the present *Super Connie*. Each subsequent model was built around increasingly powerful engines as they became available to the airlines.

With increasing demand by airlines for greater cubic capacity to handle high density loads and to provide flexibility of seating, plans were evolved to lengthen the *Constellation*.

To design a new transport costs many millions, but by taking the current model 749 and adding nine feet ahead of the leading edge and another nine directly behind the trailing edge, the prototype 1049 *Super Connie* was born. The total wing area remains unchanged, although the higher gross weight has brought about a wing loading of 73 lbs. per sq. ft. with consequent higher stalling speeds. This new gross weight of 120,000 lbs. was questioned by pilots, so a series of performance tests were conducted by a committee from the Air Line (*Continued on page* 54)

Lake-hopping in the Canadian wilds was adventure to stir a sportsman's soul—except for the time there was

No Way Out

By JOHN T. RACE

AS COMPANY pilot for a Rockford, Ill., concern, I had flown in and out of scores of lakes located deep in the Canadian bush. The company's Grumman *Goose*, versatile and dependable, was an ideal airplane for this sort of flying. The two powerful Pratt and Whitney "Wasp Jr's" provided that extra thrust to lift the usually greatly overloaded aircraft from many a small Canadian lake. Its easy handling on water was always reassuring. In other words, here was the ideal aircraft for flying fishing parties into Canada. For two years I had the pleasure of doing this sort of flying. I began to feel that the lakes of Canada held no surprises for me—until a cool, clear day early in May, 1949.

On May 12, I took off from Rockford with five prominent businessmen for a week of fishing in Canada. Our first stop was at the Canadian port of entry at Fort William, Ontario. At Fort William we cleared customs, refueled and headed for Gulliver Lake—some 120 miles northwest. There was a small hunting and fishing lodge at Gulliver. The plan was to use the lodge as a headquarters and fish the lakes in that vicinity.

It was mid-afternoon when we touched down on the cold waters of Gulliver. After unloading some of the equipment we decided to make a survey flight of the region before sundown.

We took off and flew southeast for a while—admiring the countless lakes. One peaceful, innocent appearing lake caught our eye and was so inviting that we decided to land on it, which we did. Who would believe that this serene body of water was a trap? There was a beautiful sandy beach on the northern shore and after a few minutes debate with myself I decided to lower the landing gear and taxi ashore.

The beach had a very gradual slope and I felt the wheels grate on the bottom while we were some 100 yards off shore. The weight of the Grumman was gradually being taken up by the landing gear as we neared a depth of a little over two feet; most of the craft's four tons was carried by the landing gear. About 100 feet off shore—taxiing very slowly—I made a right turn in order to line up my approach. As I turned, the plane listed to the right. I couldn't taxi any further. Even full power on the right engine wouldn't move the mired plane.

At the time, I didn't think the situation was serious. The solution seemed obvious—remove as much weight as possible from the airplane. We used our collapsible two-man boat to transport passengers and equipment to shore. This accomplished, I waded out to the airplane—the water was frigid—and started the engines.

The ship would still do nothing more than pivot. My next move was to return to shore and find a sturdy piece of wood. I attempted to scoop sand away from the front of the mired right wheel. This I did in relays, since the water was so cold I had to return to shore every few minutes. Once again I climbed back into the airplane started the engine, applied full power. The right wheel sank still deeper in the sand. By this time the situation was serious.

It was now late afternoon and spending the night at this lonely lake loomed as a formidable possibility as each minute passed. Three of our group were quite elderly and the hardship of waiting for rescue through a cold Canadian night without proper equipment was cause for anxiety.

My next move was to have the two younger men of our group board the airplane and proceed out to the tip of the left wing. I thought their weight would produce sufficient lever action to take weight off the right wheel and allow me to taxi out. This, plus more sand scooping, was to no avail, and finally the craft was listing to the right so much that the fuel pump on the left engine would not pick up fuel.

The situation seemed hopeless. Analyzing the situation again, I decided the answer lay in retracting the landing gear. It would then be a simple matter to taxi out into deeper water. Of course, with the weight on the gear, retracting was impossible. In fact, I had applied so much pressure on the hand retraction mechanism that the shear pin arrangement started to give way. In desperation I let all the air out of the shock struts hoping this would release some of the weight of the ship and allow the hull, which was just touching the bottom, to carry the load. Thus I would be able to retract the wheels. Even this didn't work. There seemed to be no way out.

(*Continued on page* 54)

When the Goose rides free and easy, there's nothing to compare with Canada's salmon-filled lakes.

Thruway Strips

Landing strips along the Empire State's new highway would serve the national defense and private aviation.

SWEEPING northward from New York City to Albany and turning westward to traverse the state to its sun-down borders is evolving a magnificent 535-mile Thruway.

The jugular vein of Empire in the founding days of our fathers, this route connecting the Atlantic Seaboard with the Great Lakes justifies all the vision which can be brought to bear upon it.

We believe there is a place in the historic significance of the Thruway for a mite of vision which concerns itself with the air age. Specifically, this would involve grading off a landing strip each 50 miles or so along the right of way as terrain offered opportunity.

As all know, danger to national security in the foreseeable future lies to the north. A chain of landing strips brought to grade from Albany to Buffalo well might prove an immediately available rampart of air defense tomorrow.

In the meantime and continuously over the years such strips would constitute an aerial artery for the many thousands who on pleasure or business fly the nonscheduled aircraft of the nation. And even to air transport such a chain of strips would be a comforting and practical facility against emergency needs.

Our point, however, is not concerned with the New York Thruway alone. The Thruway is but a current vivid example of nationally significant projects to which some vision concerning the air age might be applied.

If the United States is to lead a free world into a more acceptable heritage, our various national administrations must project some coordination into the major projects. But this is true at state level as well.

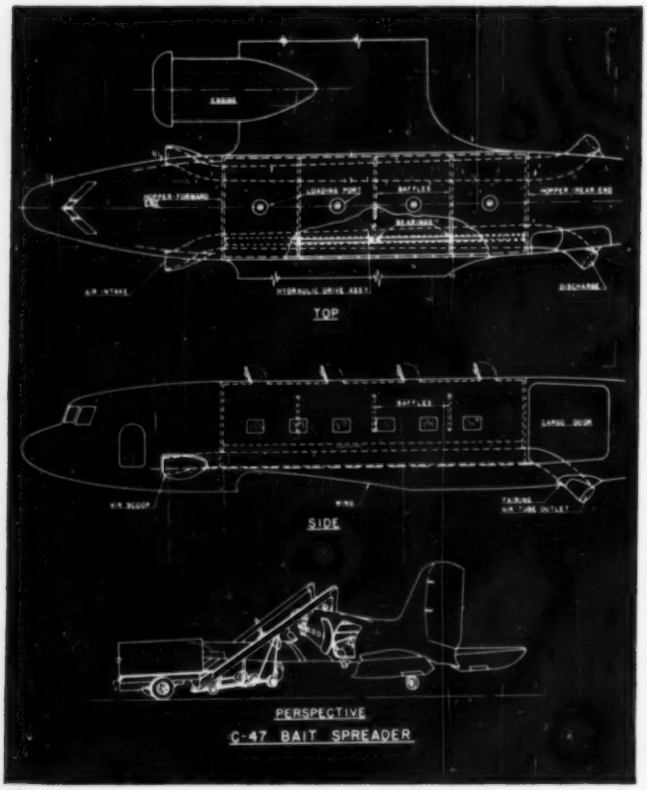
The New York Thruway will cost an estimated five hundred million dollars. This cost will amortize itself within a decade in many intangibles and probably even in dollars and cents. Those who conceived and planned it, from Governor Thomas Dewey down to the last political and engineering level, have wrought a great work. But surely at an infinitesimal fraction of expense, while machinery is on hand and opportunity most propitious, the great work could be enhanced by tying in some practical aspects of air facilities.

Any student of American airpower, civil or military, with years enough to hold the past in focus can see in retrospect where the cost of the national air commerce and security might have been saved a full half by normal foresight.

The building of the Thruway bridge over the Hudson at Tarrytown-Nyack, longest span of its kind in the world, involved cooperation between New York State and federal defense authority. And that is only one example of many facets of cooperation on the project. But did the Air Force and the Civil Aeronautics Administration ever sit down with Governor Dewey and examine the potential of the Thruway as an air asset? And can we afford to continuously miss such opportunities? We think not.

The Pennsylvania Department of Aeronautics developed a program in 1949 for the construction of six Turnpike air strips. One, at Burnt Cabins, was opened this spring. FLYING will report on it in the July issue. END

Less than 15 years ago, land too steep or too thick with underbrush to permit use of truck-mounted equipment was treated with poison bait that was scattered by hand in the path of destructive hordes of migrating mormon crickets. Today this laborious method has been outmoded,



War

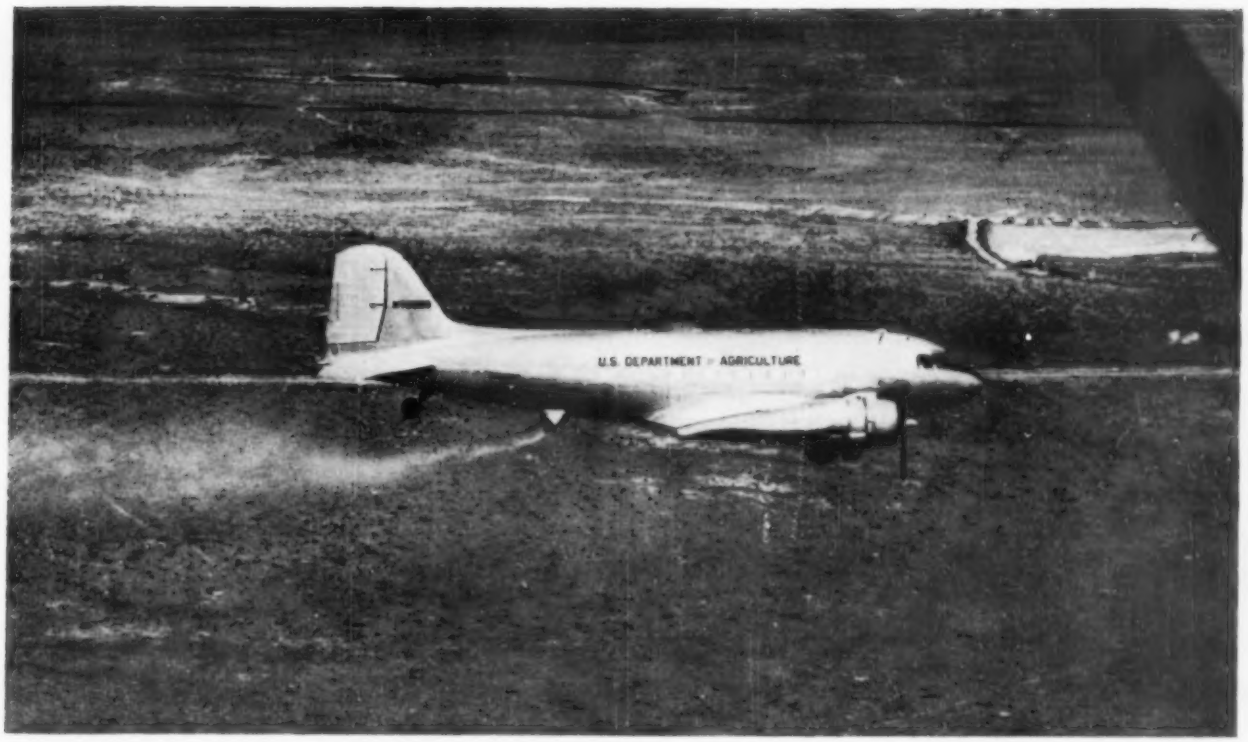
AGRICULTURAL aviation is hitting its stride in the war on insects.

In 1937, as agricultural aviation showed signs of growing into a giant operation, over $73 million worth of insecticides and fungicides were sold, according to Department of Commerce figures. The great bulk of this was for agricultural purposes. As farm plane efficiency increased, so did the number of acres sprayed. Planes sprayed a million more acres of cotton this year than last, and insecticide sales have been increasing at the rate of over $10 million a year since 1947. Some 37,000 pest control chemicals are registered with the U.S. Department of Agriculture.

Spraying, dusting and baiting under varying conditions and with different crops call for constant modification of equipment and technique. The results can be profitable know-how for the farmer and aircraft operator, or expensive guess work.

This country has plenty of low-priced aircraft. It has the pilots. It has the entomologists, chemists and engineers. The problem has been to get them all together in the most effective combination.

After one year of opera- (*Continued on page* 39)



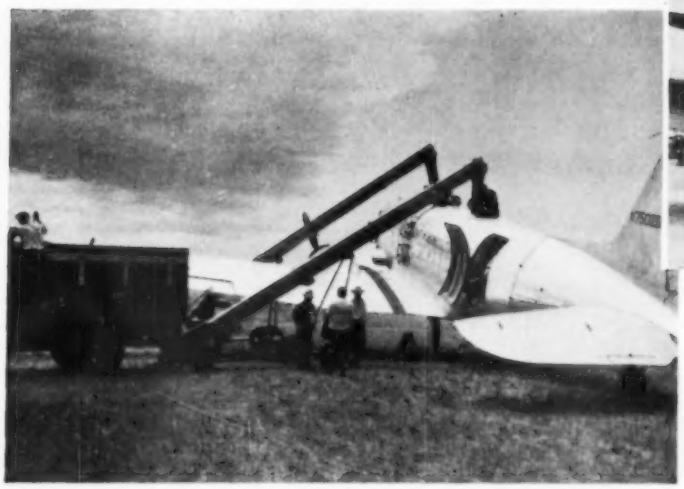
by bait-scattering airplanes. Flying at altitudes ranging from 100-300 feet over the infested area this DC-3 spreads bait at the rate of 300 lbs. per minute. Two three-man crews flying a 14-hour day, cover 20,000 acres in that time. Each acre gets from five to 10 pounds of bait.

THE AIR AGE AT WORK

NO. 2
This is the second in a continuing series illustrating aircraft at work.

for Acres

By W. U. McCOY



Front view of the Bureau of Entomology and Plant Quarantine DC-3 shows air inlets directly behind each propeller and two outlets beneath the tail.

Side view shows bait-loading elevators leading to hopper. Four tons of bait can be loaded in 10 minutes. Bureau's Oklahoma City Center develops dispersal techniques for many types of planes.

Twenty-five years ago this month,

the Pacific was first conquered by air

from California to Australia.

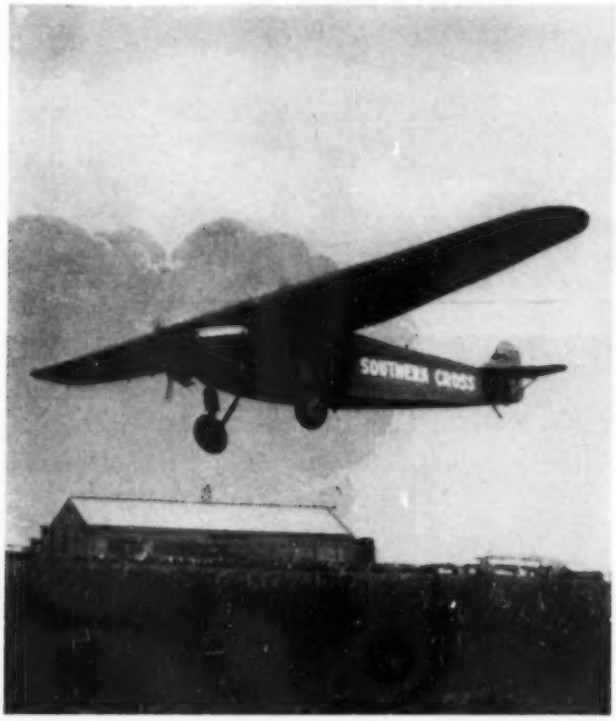
The ship was of wood—the men, of iron

FLIGHT of the SOUTHERN CROSS

By BOB ARENTZ

A quartet of superb airmen guided the *Southern Cross* on her perilous journey. Below, left to right, are her crew: Lt. Harry W. Lyon, navigator; Flight Lt. Charles T. P. Ulm, co-pilot; Squadron Leader Charles E. Kingsford-Smith, pilot; James W Warner, radioman.

The *Southern Cross* carried a gross load of 15,807 lbs. when she lifted from Oakland for Honolulu on May 31, 1928. Her three Wright J-5 engines provided an approximate total of 650 hp for take-off at full throttle. Historic take-off is pictured below.



WHEN Capt. Charles Yeager slammed the Bell rocket ship through the sonic barrier every potential hazard had been considered scientifically, and weighed. Such "calculated" risks have been the basis of all great aeronautical advances.

Lindbergh had flown the "Spirit of St. Louis" non-stop coast to coast before shooting at Paris.

When the "Truculent Turtle" left Australia, when Max Conrad took his Piper over the Atlantic, when "The Lucky Lady" flew around the world, the pay-off was not a matter of chance, but of good planning.

Four men who contributed much to this heritage of planning-plus-daring are now almost forgotten by the public, but airmen the world over generally agree that the flight of "The Southern Cross" in 1928 should be listed among the enduringly great flights of history.

"The Southern Cross" was a high-winged, trimotored, Fokker monoplane, powered by three Wright J-5 air cooled, radial engines. It was a second-hand ship and the engines were not new. In 1928, instrument flying was still in its infancy and trans-oceanic weather reporting was on a par with sweepstakes lotteries.

The Atlantic had been flown in 1927 and the number of people to cross it by air ran up to 65 or 70. But the Pacific had only been dented. The first hop to Hawaii was made in June, 1927, by Lieutenants L. J. Maitland and A. F. Hegenberger in an Army Fokker trimotor. Two weeks later E. L. Smith and Emory Bronte reached Molokai Island with a Ryan monoplane, which they force-landed out of gas. The Dole Derby on August 16-17, 1927, was won by Art Goebel in a *Travelair*, with Lt. W. V. Davis navigating. Martin Jensen and Paul Schulter also made it safely. What happened to other contestants forevermore labeled the "derby" as the Dole Disaster.

As a result, when Squadron Leader Charles E. Kingsford-Smith and Flight Lt. Charles T. P. Ulm, a pair of Australian RAF pilots, announced plans to fly from the U.S. to Australia, they met with every discouragement short of incarceration in a nut house.

The Aussies teamed with two Americans, Lt. Harry W. Lyon and James W. Warner, respectively navigator and radio operator, and the quartet went doggedly to work to plot and execute the original trans-Pacific flight.

Their first problem was money. Despite the golden flow of dollars in that era, ocean-flying capital was non-existent. The Aussie Government said "maybe," and then backed down. A group of Australian businessmen also changed their minds. Finally a Californian, G. Allen Hancock, financed enough of the effort to make the project possible.

They bought a second-hand airplane and engines to leave enough reserve money for a series of tests. For one thing, while testing, they stayed aloft for 50 hours, 7 minutes, to obtain cruise control data . . . and they set an endurance record. They carried varying loads up to 95 per cent of their extreme capability prior to taking off from Bay Island at Oakland, Calif.

During critical planning the four redesigned the rudder, beefed up the fuselage and put on stronger axles and wheels. They also got personally acquainted with every part in their three engines.

Outside of standard engine gauges and airspeed indicator, their instrument panel comprised a bank and turn, a rate of climb and an earth-inductor compass. The pilots taught themselves to fly blind with that equipment.

Life rafts and survival kits were unknown in those days, so they tucked emergency rations into the plywood, cantilever wing of the old Fokker and added a brace of hacksaws to their tools. If forced down they were prepared to saw the wing free and use it for a raft. They even included a small still inside that wing to distill sea water if necessary.

Navigator Lyon was a naval officer and rated as among the best of his day. Warner's fame as a near-genius with radio qualified him for the select crew. Both Ulm and Kingsford-Smith were World War I flyers. All four men were in their early 30's.

Kingsford-Smith, later to be knighted as Sir Charles for his exploits, was a slender, sandy-haired ace with a sardonic smile. Nervous, brilliant, and a driver of men and himself, he carried a touch of the debonair English free-booter from Elizabethan times into the 20th Century.

If Ulm were alive today and back in his youth, Hollywood would lose no time casting him in his own role as a daring and very handsome pilot. He had dark curly hair, a boyish face, a friendly smile, and was a superb, precise airman.

Harry Lyon was a stocky, round-faced, young man with bushy eyebrows and a black thatch of short cropped hair. Warner, whose mild physical appearance was most deceptive, was blond and fairish, with a dapper mustache and a keen wit.

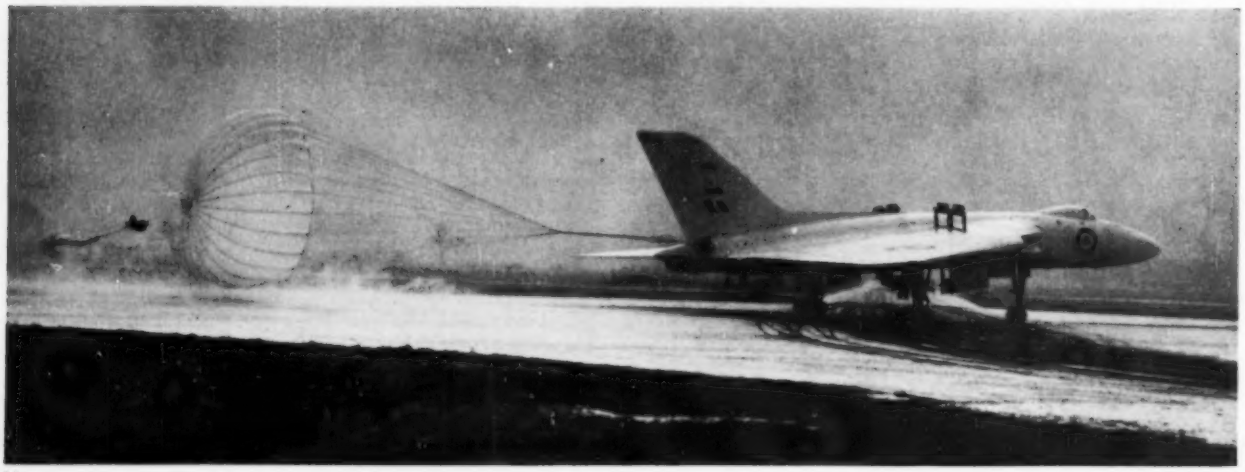
In flying the Pacific, "The Southern Cross" averaged 88.1 mph for 83 hours, 15 minutes of flying, while crossing 7,400 miles of open water. She flew through nearly 3,200 miles of instrument weather, hours of it with overloads so heavy that she was constantly in danger of stalling in the severe turbulence.

The take-off run at Bay Farm Island Airport, Oakland, was begun atop a steep wooden ramp for a gravity-assist in getting the overloaded airplane started. It was May 31, 1928, and any gambler in town would have given 20-to-1 they would never see Australia. (*Continued on page* 61)

R7V-1 Navy transport version of the *Super Constellation*, above, recently lifted 7½ tons more than its normal maximum take-off weight of 130,000 pounds. Rated fastest U. S. transport, it is driven by four 3250 hp turbo-compound engines. Weight lifting record of 137,500 pounds was part of a propeller test program.

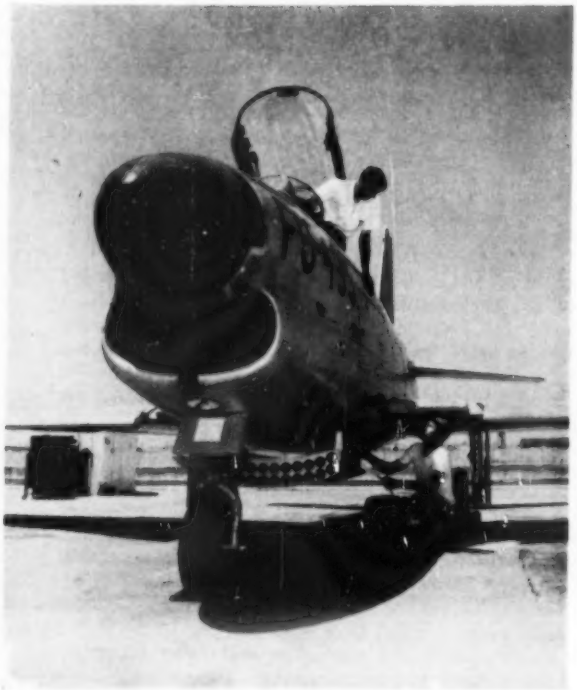
McCULLOCH MC-4 At right is the first tandem-rotor helicopter to be licensed by CAA for commercial use. The MC-4 is 2-place, side-by-side with dual control. Its 200 hp engine drives the tandem, overlapping, counter-rotating 3-bladed rotors for a maximum speed of 90 mph, cruise at 85 mph, and range of 200 miles. Useful load is 700 pounds. Year-end deliveries to civilian users are anticipated.

AVRO VULCAN Below, British delta-wing, four-jet medium bomber releases its ribbon-type parachute which acts as an additional brake on landing. The *Vulcan's* own air brakes can be seen extended above and below the wings. Now in super-priority production for the RAF, the new plane is to be powered by Bristol *Olympus* turbojets.



Have you seen?

BEECH T-34A At the right is shown the Beech-designed primary trainer which has been ordered into sustained and quantity production in the United States and Canada for the U. S. Air Force. The two-place trainer will replace the familiar T-6 *Texan*. Powered by a 225 hp Continental, the T-34A has a top speed of 180 mph, is equipped with retractable tricycle gear.



ROCKET DEFENDER Packing a mighty wallop, the North American F-86D *Sabre* jet interceptor (above) can fire twenty-four 2.75 inch "Mighty Mouse" rockets from the rocket package which tucks under the sleek fuselage. A hit from a single rocket can knock out a heavy bomber.

ATOM BOMB CARRIER Above is the North American AJ-2 *Savage*, capable of delivering an atomic bomb from either carrier or land stations, shown here on take-off for its first flight. An advanced version of the AJ-1, the AJ-2 is the largest carrier-based bomber in the Navy's arsenal. It is powered by one Allison turbo-jet and two Pratt and Whitney reciprocating engines.

TRIDENT At right is the SO. 9000 *Trident*, first French aircraft to be constructed for the purpose of realizing speeds greater than the speed of sound, in level flight. It was flown for the first time recently at Melun-Villaroche with pilot Jacques Guignard at the controls.

Curtiss-Wright's AT-9, rugged twin engine trainer, the *Jeep*.

No. 161

I learned about flying from that!

Remember the AT-9? A "hot" ship, but not so hot on one engine.

By JACK KALTENBACH

as told to

RAYMOND G. KRAMER

AS THE hours of flying time build up without mishap, a pilot can easily be lulled into a sense of security, which can lead to dangerous habits. Unknowingly, he may grow careless in going through procedures on which depend the safety of a flight.

If a pilot knowingly cuts short a procedure or skips a check list, he's apt to be alert and unlikely to forget an item of importance. If something goes wrong, he is aware of what he did and can immediately check back. However, if he commits the pilot's sin of omission unconsciously, he's an accident on wings, looking for a place to happen.

That just about describes me when I took off with my ace student back in 1943. We left the field at Victorville, Calif., and began climbing the AT-9 to 5,000 feet. It was just another routine transition flight. The AT-9, a new and highly respected twin engine advanced trainer at the time, was a "hot" airplane. We brought it in for a landing at 115 mph and, with power off, it stalled out around 75 mph. We were under orders not to teach students full flap, power-off landings, because the glide angle bordered on the perpendicular. The gear of several AT-9's had been knocked off attempting these unusual landings.

Jack Kaltenbach

We climbed toward the mountains, and as we reached 5,000 feet, I decided to have the student perform a simulated single engine landing. I had given each of my five students a sheet containing the complete procedure for setting up single engine operation, and the method for starting up the dead engine after the practice was completed. I knew all the procedures to perfection, having logged a thousand hours of instructor time. There was no need for me to follow any check list, for I knew them all backwards and forwards; or so I thought.

I turned off the switch on the left engine and watched him cut off the mixture control, ease the throttle back and bring the prop into high pitch. He looked down, saw that we were too far from the home base to make it safely, for the AT-9 wasn't capable of holding altitude on one engine, and made a wide descending turn toward the small auxiliary field which lay within range. He was doing a flawless job.

We had orders not to land on this auxiliary field, as the runways were too short for the AT-9. However, in this simulated emergency the student used fine judgment. In time of distress, it's a case of any old port in a storm, and this auxiliary field was the best place for a landing within range. He rolled out on the final approach to the short runway below and eased the throttle back.

"I could make it from here with full flaps," he yelled as we glided down. The normal procedure at that point would have been to start the dead engine and climb back to altitude, with the simulated single engine landing completed. We were at an altitude of 400 feet and had gone far enough on the practice maneuver. However, riding with five different students every day, repeating the same instructions five times gets monotonous. One of the rewards is to see a student grasp the knowledge you're throwing his way. This student was doing a mighty fine job, and I was curious to see if he could follow through. I'd let him take it on down to within 50 feet of the ground, to check his technique and also to break the monotony. Then we'd climb back to 5,000.

"Go ahead, try it," I signaled.

He let down full flaps, eased the power off and we dropped like a rock. By lowering the nose, he kept the speed up to 115 mph and did a neat job of bringing it down to within 50 feet of the end of the runway. "OK,"

I called. "Get going, I'll take care of the dead engine."

He shoved the prop pitch forward, eased on full throttle and milked up the flaps. I automatically went through the procedure to start the dead engine. I eased the mixture control and prop pitch forward and advanced the throttle. I was watching the approaching desert terrain ahead, and I hurried through the operation. He moved both throttles forward as the runway flashed past about 40 feet below. I settled back and glanced at the airspeed indicator, expecting my student to start climbing.

With both throttles full forward, the indicator hovered at 120 mph, then slowly edged down toward stalling speed. Cactus and trees were racing toward us and we were rapidly losing precious altitude.

"I've got it!" I yelled. I grabbed the throttles and shoved forward, bending them over the throttle stop. But there was no fresh surge of power. The left engine was dead.

Flying on one engine 40 feet off the ground, with the airspeed dropping toward the stalling point, I fought to keep the plane airborne. I had to lose more precious altitude to keep from stalling as we started over the rough desert terrain. Twenty-five feet below the wings, cactus and boulders swished by. My stomach was an icy knot as I zig-zagged through the Joshua trees, careful not to bank too much. I angled for the dry river bed a short distance ahead, trying to figure out what was wrong with the left engine. I was too busy to check visually for the cause and my student sat motionless, pale as a ghost.

I could either struggle to keep the plane flying, on the vague chance that the engine would come back to life, or I could set it down in a crash landing. If I could keep flying, there was a dim possibility that it would start; a speck of dirt in a gas line, a loose wire any number of minor malfunctions might clear up if I kept going.

On the other hand, I had witnessed planes that had crashed in the desert and the sight hadn't been pleasant. If the AT-9 were to smash into rocks, giant cactus or boulders, we'd be finished.

It wasn't particularly warm in the cockpit, but perspiration was pouring off me as I decided to continue the fight to keep the plane airborne.

I nursed the plane along, just off the desert and eased it down the course of the dry river bed. Any hope I might have had of setting it down, wheels up, on a smooth dry river bed, evaporated when I saw the jumble of boulders, debris and rocks below. My student had reached a point where he couldn't sit still any longer.

Lucky Decision

"Let's crash land!" he yelled. At the same time, he reached up and flipped off the engine switches. The plane sagged momentarily from the loss of power. I've never moved so fast in my life. My hand shot up and I had all the switches back on in a split second.

As the switches clicked back "on," the dead engine surged to life. With both engines at full power, I held it level, picking up speed. We were level with the jagged banks of the river bed. When I reached 120, I started climbing.

I leveled off at 3,000 feet, leaned back, exhausted, and let the student fly the plane. It was quiet in the cockpit as we returned to the home base; neither of us felt like talking. When we landed, I turned to the cadet and broke the silence.

"Let my mistake be a lesson to you," I said. "Always use a check list and never hurry when you're flying an airplane." I didn't have to explain; he was well aware of the mistake I'd made.

When I had told him to climb back up to altitude after coming in over the edge of the auxiliary field, I had gone through the procedure of starting the dead engine. Hurrying through the operation which I had performed a hundred times in the past, I had neglected to turn "on" the magneto switch. With that switch in the "off" position, the engine couldn't possibly start. When a crash landing had seemed imminent, he had reached up and flipped "off" the main and right magneto switch. In the tenseness of the moment, he hadn't noticed that the left switch was already in the "off" position. A split second later, I had instinctively turned "on" all three switches and the dead engine had roared back to life.

It wasn't only my student who learned a valuable lesson. The "check list complex" I've had for years originated that day over the dry river bed. END

War for Acres

(Continued from page 32)

tion, a new organization, the Aircraft and Special Equipment Center, is showing where a large share of the answers is likely to come from. Here, the U.S. Department of Agriculture's Bureau of Entomology and Plant Quarantine has consolidated its aircraft work in a move designed to produce versatile and exact dispersal equipment and techniques for handling the problems of agricultural aviation.

Until a year ago, many far-flung stations of the Bureau kept their own planes and pilots, and their work was keyed to their own local needs. Private pilots and contractors learned by observing one another. The great need was for a consolidation of research and effort, so that lessons learned in one area could be assessed for immediate adaptation to other areas, other problems.

Work at the new Center, near Oklahoma City, Okla., is concentrated on developing insecticide dispersal equipment, demonstrating it and applying new insecticides for experimental purposes. Field stations of the Bureau of Entomology and Plant Quarantine are located at Beltsville, Md., and Forest Grove, Ore. These stations utilize some of the Center's aircraft in doing special research.

Planes based at these three points bombard insects over hundreds of thousands of acres of public domain—the gypsy moth, grasshopper, mormon cricket, tussock moth and others—from New England to California. The Center works with state and federal agencies on effective means of applying new insecticides, with the findings freely available to all commercial operators.

This new effort is headed by veteran agricultural aviation specialist Kenneth Messenger. The Center also assists in development of specifications and contracts for aircraft operation on projects in which the Bureau cooperates. And, in cooperation with the Civil Aeronautics Administration's Aeronautical Center, also located near Oklahoma City, it is developing standards for agricultural pest control aircraft operators throughout the country

Here are some examples of problems faced by agricultural aviation operators everywhere, and how the Center is solving them:

The Bureau needed to learn the best nozzle location and pump pressure for a particular spraying job. A "colorimetric" system was used. Glass and metal plates were laid out on the ground, crosswise to the line of flight, and color was used in the spray.

Following a flight run, each plate was picked up individually, after recording the position in relation to the line of flight. The colored material was washed off and put into test tubes. Then the color quantity measured gave the amount and rate of deposit on each plate. The distribution and density of the spray could be measured exactly, and exact settings determined.

In grasshopper control, at one time it was necessary to dump the poison bran into hoppers manually, with erratic and uneven distribution. The Center, using a DC-3, diverted the hydraulic system that normally operated the automatic pilot to operating a metering rig.

Now 7,000 pounds of the poison bran can be loaded mechanically, then dispersed without a crew to handle it. This same hydraulic pump powers the spray rig, and it only takes three hours to convert the DC-3 from bait to spray rigging. Carrying 900 gallons of spray, and spraying a gallon to the acre, it takes about six minutes to empty.

Last summer, one of the Center's DC-3's, on three jobs, covered an area equivalent to one-fourth mile wide from Oklahoma City to Bangor, Me.

Progress Against 'Hopper

Grasshopper control offers a good example of research and progress involving

TAILORED TO A "T"

Marine Lt. James H. Orr of Santa Ana, Calif., in Japan on a hurried trip from the Korean base of the First Marine Aircraft Wing, ordered a new uniform from a Japanese tailor. As a pattern, he left an old uniform, with a large darn over one of the trouser pockets.

Several weeks later he returned to pick up the new uniform and found that the tailor had done his work too well. The new uniform was absolutely perfect—including an exact duplication of the darned spot.

just one pest.

As late as 1940 the control in widest use was a wet, cohesive bait of sodium arsenite, bran, sawdust and water. In 1941, sodium fluosilicate widely displaced sodium arsenite in the mixture. The substitution reduced hazards to livestock and to operators. It improved results.

In 1949, another bait was used, a mixture of dry bran and toxaphene or chlordane diluted with a little kerosene. This gave even better results and operators were able to reduce the per-acre application rate. With this change to a light, free-flowing mixture aircraft came into heavy demand.

It seemed a fine solution at the time, but just two years later, almost all grasshopper control was accomplished with entirely different material. Sprays consisting of two ounces of aldrin in one gallon of kerosene applied at the rate of one gallon per acre gave quicker and better results, with greater economy. The agricultural airplane owes its indispensability to development of such mixtures. No other instrument could spread such a small quantity over a large area with such even results, such speed, and such economy.

There are many reasons for the rapid transition toward liquid pesticides, Messenger points out. Liquids can be applied more uniformly than dust. They usually drift less. The toxin ingredient does not separate from the diluent. The particle size can be altered rapidly to satisfy special requirements. The material will adhere more firmly to plants and pests, giving it greater residual value.

One DC-3, releasing a gallon of spray per acre, covers 5,000 acres in one day. If a grasshopper epidemic is on, there will be some 75 grasshoppers per square yard. Spray, in one day, will kill 1.5 billion grasshoppers, or 480 tons of the pests.

This is an outright saving of 2,000 tons of range feed which the 'hoppers would have eaten in that one day. In one day, speed alone would save a year's feed for 125 head of cattle!

The Bureau of Entomology and Plant Quarantine, in cooperation with several states in the Northeast, has sprayed large acreages of forest lands for control of the gypsy moth. On this work, one DC-3 load of insecticide sprayed an acreage equivalent to that formerly sprayed by one ground unit in four and a half years

What about crops such as cotton?

Contract aerial operators, for instance, will have sprayed around three million acres of cotton this year for control of boll weevil and other insects and for defoliation before picking. This is an increase of about one million acres over last year. Similar increases are taking place in acreages sprayed for other crops.

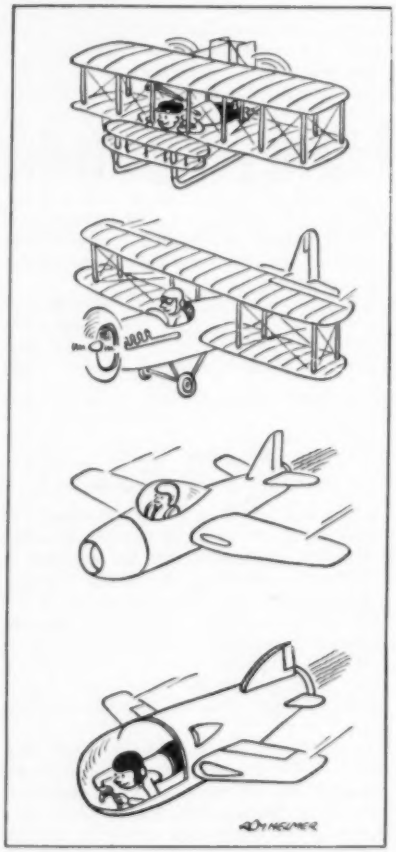
Unlimited Uses

These great increases each year in the use of agricultural aviation show that its possibilities in the field are limited only by its ability to find ways to do a job more efficiently.

Many aircraft operators have bogged down in considering the most efficient methods of spray release. Messenger has some words on this subject:

"To reduce the problem to perhaps its simplest form, it may be assumed that three ranges of drop size are commonly needed in aircraft spraying. Very small, slow descending, space-filling drops are used for controlling insects in space. Drops large enough to have residual value but still small and numerous enough to cover plant surfaces are more useful for controlling sedentary insects and plant diseases.

"Mobile insects are controlled adequately with still larger drops, since a long residual effect rather than complete coverage is the important consideration. Weeds are controlled and cotton is defoliated satisfactorily with these larger.



more easily controlled drops."

Messenger explains that even when the most effective drop size for any particular problem can be determined, a considerable range in size is still inevitable. And it is obviously impossible to produce spray drops of such a size that they will fall quickly to the crop, and yet circulate or swirl about the leaves and stems of the plants being treated.

"These physical limitations need not be seriously restrictive, however," Messenger says. "Under some conditions where cross winds may be utilized, a wide range in drop size may even serve to advantage in obtaining an effective deposit over a wide swath."

Although most of its work is with equipment, the Center continues to cooperate in insecticide testing at a number of the Bureau's stations.

For example, the Center supplied plane and pilot and supervision for putting out test plots of 2-4-D in controlling wild currant and gooseberry bushes—the host plants for white pine blister rust which had been damaging the pines of the Northwest. Without the host plant, the rust cannot develop to prey on the pine.

Heretofore the bushes had been grubbed out, or sprayed with small rigs brought in by pack. This was very slow and expensive, and areas were hard to reach.

The problem, moreover, was to spray the host bushes from the air when towering pines blocked the way. Being used in tests is granular, pelletized 2-4-D. These pellets drop down through the pines, to volatize and defoliate the bushes. It is hoped this will be the method to break the advance of the rust.

"Even if it doesn't kill the rust off and we have to do it every year," Messenger says, "it will be much cheaper than having crews grub it out by hand."

Outwitting the Worm

Another unusual experiment, in Florida, is aimed at cutting the tremendous livestock loss from screw worms.

A 1,000-square mile plot in the Daytona Beach-Orlando area is the site for the test. Bureau entomologists, with help of the Atomic Energy Commission, found a way to sterilize male screw worm flies. In a carefully developed pattern, these male flies are dropped until the area is covered, with a specially developed device for dropping.

Reason: the females mate only once. They will mate with sterile males, lay sterile eggs. Extinction for the screw worm.

Pens of caged animals, slightly wounded, are placed in the area. These animals will attract deposits of screw worm eggs, and the work can thus be checked. If this experiment is successful, a good part of Florida and other states will probably be covered in the future.

As commercial operators improve their methods, they are being used more and more in this far-flung work. "We are using our planes more for demonstration and research," Messenger says.

The Center's planes will continue to fill in and do check work, always point the way to more efficient and exact operation and economy.

Messenger explains that the government gets a wide variety of bids on work to be contracted out, because most operators have done limited types of work and when they bid on something different it is hard for them to know what it will cost or what it's worth.

Commercial operators interested in working with the government agencies write to the Bureau of Entomology headquarters in Washington or to any of the various divisions of the Bureau scheduling work, and ask that they be placed on any mailing list for future bid invitations. The division which sponsors a program sends invitations to bid to all operators

on the list and to other known operators they feel are qualified.

The Center itself keeps only a skeleton pilot crew, and depends on hiring pilots during the peak season from April through August. Need is for men who have sound experience in crop spraying or dusting.

The Center keeps up its special equipment research with a wide variety of planes. Most spectacular is the workhorse DC-3. Its bait and spray rig has aroused interest in the Union of South Africa and the Belgian Congo, among other points.

The DC-3 can put out 50 tons of bait in a day—enough to destroy three billion or 980 tons of grasshoppers. That would have the effect of saving 4,000 tons of range feed, the annual forage supply for more than 250 head of cattle. Bait is chiefly used for mormon cricket now, and spray control for grasshoppers is even more effective than the DC-3 record with bait.

The DC-3 rig is hard to beat where great areas are concerned, but the bulk of commercial insecticide work is done on smaller tracts, with smaller planes. The special equipment center works with most types in general use. It experiments with Piper *Cubs*, N3N's and Stearmans.

Pea Aphid Tests

Experiments recently made at the field station at Forest Grove, Ore., will be of special interest to operators. The tests were made in spraying for pea aphid, but with some modifications would be applicable to many types of control work.

It was verified that where 24 to 30 nozzles are employed, the overall spray boom length need not exceed 11 to 12 feet either side of center, and that the 3 or 4 feet of boom immediately to right of center should be provided with 2 to 4 nozzles, while the corresponding section to left of center should be stripped of nozzles. Beyond the effects of the propeller slipstream or vortex (4 to 5 feet either side of center for the Stearman biplane) the nozzles may be arranged symmetrically out to 11 or 12 feet. A net of 2 to 4 nozzles more are needed on the right than on the left side of center. The wing-tip vortices begin to be effective in "sucking" spray toward the wing-tip at about 6 to 7 feet either side of center with the force progressively increasing toward the wing-tip.

Tests demonstrated that in addition to lateral variations in deposit rates across the swath, there is also a less pronounced but definite longitudinal fluctuation in deposit rate, due to propeller slipstream and wing-tip vortices. This causes the spray discharged within the zone of influence to oscillate both laterally and longitudinally (relative to line of flight) over several feet. The midwing zone is relatively free from oscillation.

It was found that spray applications at extremely low elevations can be made during surface wind velocities of 5 or 6 mph, provided thermal currents are either not present or only slightly evident.

When necessary or desirable to make applications at medium flight levels (6 to 10 feet) above the peas, surface winds of more than 3 miles per hour velocity will cause considerable drift and may result in inferior application.

Messenger declares: "Immediate improvement of aircraft pest control seems to depend less on increased research in the fields of entomology, plant pathology, plant physiology, and chemistry, or on better aircraft or more adequately trained pilots, than on the application of sound engineering principles."

Along with a growing number of those in agricultural aviation, Messenger believes that the plane will eventually replace ground equipment, perhaps as fully as ground equipment has already replaced the horse and mule.

For, every season agriculture finds new jobs for the plane. END

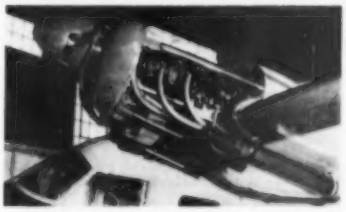
A modified *Widgeon*

WIDGEON CONVERSION

A conversion of the Grumman *Widgeon*, which permits the amphibian to operate out of short fields and small lakes and to attain speeds desirable for executive aircraft performance, is being handled by the newly formed McKinnon-Hickman Aircraft Co., of Portland, Ore.

The modification, approved by the CAA, consists of substituting 260 hp Lycoming engines for the standard 200 hp Rangers. Hartzell full-feathering propellers and specially designed low-drag cowlings are a part of the power package installation. Gross weight as a landplane is increased to 5,000 lbs. and as a seaplane to 4,700 lbs. The full conversion adds only 161 lbs. to the Widgeon empty weight.

The conversion is available in three ways. It may be purchased in kit form, with the purchaser securing his own engines and propellers and having the installation done at a base of his choosing; the complete installation may be made at the Portland factory or by Jim Welsch Aircraft Sales, New York representative of the firm; or, McKinnon-Hickman will supply a completely remanufactured and converted *Widgeon*.



Engine with cowling removed shows exhaust system ending in an augmenter tube. All fuel, oil and electrical lines and tubing are of quick-detach type to permit two men to remove the engine in minimum time.

A. G. "Mac" McKinnon, who was in the contracting business in the Northwest got acquainted with the *Widgeon* during his air travels for his company. Vern Hickman was formerly director of the maintenance division of Western Skyways at Portland-Troutdale Airport. Their new company manufactures the conversion job at their hangar on the Portland-International Airport.

One of the first contracts signed by the new concern covered the conversion of the fleet of 10 *Widgeons* belonging to the Fish and Wildlife Service of the U.S. Department of the Interior.

The table below contrasts *Widgeon* performance figures, with and without the conversion.

PERFORMANCE DATA

	Lycoming 260 h.p.	*Ranger 200 h.p.*
Take-off run @ sea level, Gross Weight	600 feet	895 feet
Take-off from glassy water, Gross Weight	10 seconds	25 seconds
Rate of climb @ sea level	1,750 ft./min.	1,000 ft./min.
Climb to 10,000 feet	10 min.	15 min.
Cruising speed @ sea level (75% Power)	170 mph.	150 mph.
Cruising speed @ sea level (62½% Power)	155 mph.	138 mph.
Cruising speed @ 6,000 feet (62½% Power)	160 mph.	146 mph.
Maximum speed @ sea level	182 mph.	164 mph.
Service Ceiling (Estimated)	18,000 feet	15,500 ft.
Landing speed	62 mph.	58 mph.
Gross Weight	5,000 lbs.	4,500 lbs.

OPERATORS' CORNER

National Aviation Trades Association (NATA) is a service group that represents all service segments of the airport, fixed-base and air service operator. Its staff represents a federation of State Chapters and Members-At-Large. Its purpose is to fountainhead all activities of the American Operator, and to act as a sounding board for better public relations. Its aim: to improve air service operations and promote greater aircraft utilization.

Headquarters are located at 1346 Conn. Ave., N. W., Washington, D. C. Members receive a monthly "Washington News Letter" of confidential legislative and policy news in the making.

National Air Taxi Conference, same address, an affiliate of NATA, represents operators engaged in perfecting and standardizing a system of "through" air transportation.

Opinions expressed in this column are not necessarily those of FLYING Magazine.

Airport service operators who have been instrumental in the swing-over to CAA's new VHF navigation, through the installation of omnirange equipment in corporate and private aircraft, have been honored by awards from Van Dusen Aircraft Supplies. Minnesota operators who received awards from G. B. Van Dusen (second from right) are: Malcolm Manuel, Triangle Aviation, Stanton; Glenn Degner, Southern Minnesota Aviation Service, Owatonna; B. G. Vandre, Van's Air Service, St. Cloud, and Jack Lysdale, Lysdale Flying Service, South St. Paul. James Riddle, president of National Aeronautical Corp., looks on at right.

William Lotzer (left) of Gran-Aire, Milwaukee, was reelected president of the Wisconsin ATA at its annual meeting in LaCrosse. With him is Harland Herrin, NATA president.

AIR POWER POTENTIAL

An urgent recommendation by NATA to the new Administration and Congress for the fullest development of U. S. air power potential has been made. NATA believes there are five areas where understanding needs to be developed:

1. Establish an airman training plan that will replenish the depleted civil airman manpower resource in pilots, mechanics, technicians, navigators and others.

2. Consummate R.O.T.C. legislation that will bring flight indoctrination into air R.O.T.C. units.

3. Establish in the military air reserve program a plan utilizing the widespread available facilities of the civil aviation schools for maintenance of proficiency and further training of such reserve personnel.

4. Utilize existing aviation technical training schools by the military establishment for mechanic and technician training, at least in the basic stages.

5. Expand air age education programs on a uniform national pattern and permit youths in senior years of high schools who display maximum interest and ability in the air age programs and who are of proper physical caliber to participate in the air indoctrination through basic flight training.

PACIFIC AIRMOTIVE

A unique "Parts at Call" plan has been announced by Pacific Airmotive. With the need for parts growing steadily, much time is and can be spent looking for replacements. Bruce H. Atwater, vice-president of P.A.C., writes that customers can now furnish them with a list of anticipated parts requirements, and Pacific Airmotive will virtually ear-mark such equipment for the customer. The buyer-operator will not have to tie up large sums in inventory, yet he will have the required parts lined up and available, with minimum delay.

THE NEW TWIST

The Toledo (Ohio) Air Pilots Association uses attractive stimulants at their breakfast flights at Toledo Municipal. Along with the usual youngest, oldest pilot, plane, etc., prizes, this year they offered glider passenger rides. Incidently, all the coffee you could drink—free. We call it "salesmanship."

Above is a Cessna equipped with a new crop spraying attachment for which Art Whitaker, Pearson Airpark, Vancouver, Wash., has received CAA approval. Two external tanks have a total capacity of 86 gallons. Either unit may be operated independently and instantaneous release permits emergency dumping. Passengers may be carried without removal of the equipment except for fans and dispersal brushes, a five-minute job.

MORE POWER TO U.S. !

Republic is adding a new deadly vehicle of Defense to Democracy's arsenal. It is the swept-wing F-84F ***THUNDERSTREAK*** *. . . latest, fastest flying member of a rugged family which has long served the U. S. Air Forces' needs in the fighter and fighter-bomber field. ➤ ➤ ➤ Now coming off our assembly lines, the* ***THUNDERSTREAK*** *flies faster, higher and farther than its combat-proven predecessors . . . the F-84 Thunderjet and the F-47 Thunderbolt. It carries more armament and performs with greater mobility the many tasks our Air Forces and the NATO Air Forces require in a fighter aircraft. ➤ ➤ ➤ The more than 20,000 Republic designed and built planes, predominantly fighters, which preceded the versatile* ***THUNDERSTREAK,*** *have led the way to America's present superiority in Air Power.*

REPUBLIC AVIATION

FARMINGDALE, LONG ISLAND, N. Y.

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Typhoon at Oke

(Continued from page 15)

failed; but flying the bomber fleet to another base out of the typhoon's path also took the ships hours away from their main forward base. These might become crucial hours—the difference between the success or failure of a retaliatory attack or an offensive strike.

At various times efforts were made to tie down the giant planes. Cables were fixed to the wings and tail and anchored to the ground. But the more rigid the ships were made, the greater became the danger of cracked spars and internal damage. Later, the planes were sandbagged and sheltered, but fierce gusts simply tore away the shelters and threatened to flip the craft over.

Ground Flying

Gradually the "ground flying" technique was evolved, as part of an overall standard procedure established in the islands to meet the typhoon threat. The objectives of the plan are to minimize storm damage and to maintain maximum combat effectiveness in spite of the worst the typhoon can do.

As soon as the typhoon alert is flashed, the plan goes into effect. Whether the ominous warning has come from a ship, a plane or one of the weather stations in the vast network covering the Pacific, it is promptly channelled to the Air Force typhoon warning center at Guam. At this central clearing house for typhoon information, the reports are studied. Moments later, planes of the 2134 Air Weather Wing, MATS, are racing out to verify the typhoon's position.

Their job is reconnaissance. Using B-29 weather ships they stalk the whirling mass, circling and dodging like dogs at a marauder's heels. Periodically, one of the ships plunges into the heart of the super-low pressure area to check its strength by measuring wind, rain, temperature and visibility. The information is then radioed to the warning center.

As reports pour into the center all the skill and resources of the weather specialists are brought to bear on the job of predicting the probable course of one of nature's most unpredictable phenomena. When a decision is made the alert is passed to the territory most likely to be hit.

On Okinawa the word was received that the typhoon bearing the code name "Karen" was on the way. Condition Three went into effect and the island responded. Scattered equipment was stowed and typhoon shutters checked. Emergency caches of food were prepared.

As "Karen" maintained its collision course with the island, less than 24 hours away, Condition Two took over. Shutters were put in place, vehicles stored and everything movable lashed down.

With "Karen" 12 hours off, Condition One sent all personnel not on essential duty to quarters. Cargo and liaison planes were evacuated. Smaller ships were sheltered with a circle of huge trucks and tied down. The B-29s were made ready for their "mission."

Karen Arrives

The ships lined up along the taxiway, standing by and braced for "Karen," didn't have long to wait. Rain began to tumble down, slowly at first and then in driving sheets. Soon it was lashing the mammoth planes in horizontal streams driven before an explosive wind.

For several hours it held at 50 knots. The tower crackled the announcement to change heading, and the wind picked up in short bursts to 70, then 80 knots. Eight hours passed, then 12!

Inside the planes the crews ate their cold rations and drank strong coffee from thermos jugs. Sleep was impossible until the storm abated. Back in the ready room, substitute crews were waiting to race out and take over if the wind dropped back to a safe level.

Instead, it climbed to 85 knots and the engines were started. A new heading came up every 30 minutes until the planes were almost 180 degrees from their starting point. Then the typhoon's eye swept over the island and the wind fell back to 60-knot gusts.

Eighteen hours passed and the crews clung to their stations. Pilots and copilots alternated at the controls. Their arms and legs ached from the constant strain. The other crew members napped briefly.

Suddenly the wind roared again and slowly climbed to a crescendo. It passed 100 knots and went on to 110, then 125. The crews struggled to hold the ships on the ground. Engines were raced to hold the planes on the ground against the buffeting wind. Twenty-four hours had passed.

Eventually the storm slackened. The wind fell back to 70, then 60 knots and at last below 50. Thirty hours after the crews had taxied the B-29's out, the giant planes came back to the line. Quickly their tanks were filled and they were checked for damage. The fleet was ready for immediate combat. One flight was bombed up and sent on its way to a North Korean target.

"Karen" had passed safely. The crews remembered "Ruth" which the year before had kept them fighting the storm for 60 hours without relief. They knew, too, that from March through October there would be other typhoons and that fighting them would be vital to the success of the 20th Air Force.

Sure enough, a few weeks later the message was received on Okinawa: "Typhoon Alert—'Agnes' heading your way." The message concluded with a confident order: "Take the usual precautions." END

PILOT AID

BY BOB BLATT

CHAIN TIEDOWNS

By replacing rope tiedowns with heavy chain, maintenance costs will be lowered considerably and safer and more dependable tiedowns for all size planes will result, according to Col. Robert W. Gallaway, General Manager of the County Airport Corporation, operators of the Westchester County Airport, White Plains, N. Y.

The picture shows Col. Gallaway with one of his all-chain tiedowns. They are replacing the ⅝ inch manila rope tiedowns formerly in use at this airport. Gallaway claims that the chains will pay for themselves in 18 months. From then on, he claims that they will last indefinitely—and without any maintenance. Two 14-foot and one 10-foot chain are used at each tiedown location. Each end of each chain has a swivel joint spring clip. The top end clips in the plane's tiedown ring on the wing or strut and the lower end clip is used to make the chain the proper length for the particular plane by simply clipping it in the link which provides the best chain length.

Gallaway says that the only trouble so far with the chain tiedowns is that the pilots like them entirely too much and some of them have disappeared. He has licked this problem by putting a bolt through the chains where they loop through the anchor ring and then spot welding the nut so that it can't be removed.

The chains are heavily galvanized to resist rust and corrosion. Gallaway says that they are equal in snap strength to a ¾ inch manila rope and will easily and safely hold planes like Twin Beeches, Twin Cessnas, *Mallards*, etc., in any winds likely to be encountered in the area.

Each tiedown rod has a ring projecting through the top of a 24-inch diameter round concrete base which is 3 feet deep (into the ground). The rod projects down another 3 feet below the concrete base and has an anchor at the bottom. The top of the concrete base is slightly conical to project somewhat above the turf and is painted with white traffic paint to make it extremely easy to see when taxiing into the parking position. These tiedowns were Gallaway's idea. They were installed by the airport's field maintenance crew under the direction of Gene Graziano, Superintendent of Operations.

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FLYING FARMERS

By BILL RENSHAW

SELLING AVIATION

This is being written on a flying vacation trip to the southwest. At the end of the second day, one thing stands out in marked contrast to our home bailiwick (Indiana, Illinois, Wisconsin and Michigan.) It is the splendid effort that is being made to sell aviation.

At Springfield, Mo., the efficient and courteous line boy asked if we wanted our planes hangared? When we said, "They'll be all right tied down," he replied, "tie down is fifty cents, hangar a dollar."

When we inquired later as to how they could hangar our Ercoupes for a "buck", we were told: "It's better to have our hangars full at a dollar per plane than empty at a higher fee."

We also noticed that the taxi drivers, motels, restaurants, etc., do not have one price for the tourist who travels by car and another price (sometimes twice as much) for the fellow who has an airplane.

Our observations proved pretty conclusively that there are more folks of moderate means flying airplanes than there are of great wealth. It is time that we get some of our midwestern folks to realize this.

At Springfield, Mo., Municipal Airport the line boy worked hard to find us rooms at a moderate price, after which he went to work on trying to save us a $4.00 taxi fee. In fact, we would say without reservation that the Springfield operation is one of the best operations we've ever run across.

The Springfield operation is in the same category as P and B at Pensacola, Fla., and Murdale Airport at Carbondale-Murphysboro, Ill. Both of these airports were awarded the "Airport of the Year" Award in recent years. (This award is made annually by midwest flying farmers.)

We have long preached that airports can bring themselves a lot of business by working out a deal with some of the good hotels or motels.

At Springfield, Mo., this is proving true, as our experience showed, when the owner of Cordovia Motel told us he will go to the airport and pick up anyone who wants to stop with him and then deliver him back to their airplane the next day. It works.

* * *

TOSS A COIN

Flying farmers, generally very tolerant and understanding, are becoming somewhat impatient with weather reporting and forecasting. For instance, one flying farmer, grounded at Meigs Field, Chicago, phoned weather and asked, "What are my chances of flying VFR to Indianapolis late this afternoon?" He was told, "no chance at all."

Five minutes later, knowing that the chances were good that he would get a different forecaster, he picked up the phone and again asked, "What are my chances of flying VFR to Indianapolis this afternoon?" Back over the wire a cheerful voice replied, "very good, sir, very good." The bewildered FF writes—"I took a train."

* * *

PEARLY GATES

City folks who attend flying farmer sessions come away amazed at the culture flying farmers have acquired.

They particularly applaud the humor FF's poke at themselves—humor like that contributed by Mrs. Karl Mays, who illustrated her talk at the recent clinic with a hurriedly dashed off bit of verse. It went like this:

I dreamed I died and to heaven did go,
As I approached the pearly gates I bowed down low,
And to St. Peter I did say;
I'm a flying farmer from earth, you know.
My how St. Peter and the angels did stare,
Come right in, they said, you're the umpteenth one from there.

* * *

STRIPS PAY OFF

Flying farmer Russell P. Drake, Boone County, Ill., still maintains two landing strips, though he no longer has an airplane. Expense of maintaining strips was more than justified last year when two transient pilots used his strips when they ran into trouble.

Strip is also convenient for Drake's brother who does considerable flying. On a pleasant Sunday afternoon last summer, brother Forrest, flying off the strip, gave 13 neighbors their first flight. All came back thrilled and pretty well sold on flying. Sounds like those two strips are more than justifying "their keep."

* * *

WEAKER SEX

Midwest FF's are wondering if their women folks are preparing to "wear the pants," to use a farm colloquialism. For years the FF's of Illinois and Indiana, with some help from the neighboring states, have sought to sell farm flying to their ladies.

The movement was a little slow gaining momentum, but in the last year the girls have really kept the props spinning. At a recent meeting more than half the panel discussions were engineered by FF women. One panel headed "Aviation Suffrage for Women" was so vibrant that one wag remarked: "Remembering Adam and Eve, I wonder if this thing could get out of hand."

Regarded as a good omen is the sky dotted with flying farm women, many of whom got their private tickets ahead of their husbands.

Answering her own question, "Is there suffrage for women in aviation?" Mrs. John A. Misner, Madison County, Ind., declared: My theory was and is that there is not—to-wit:

A. Most airplane manufacturers do not consider women when they design the planes.
   1. Tight skirts
   2. Full skirts
   3. Handbags
   4. Hats
B. Many airport operators do not consider women, either as students, guests or wives.
   1. Restrooms
   2. Courtesy
C. Neither of these categories takes into effect the buying power of the average woman, both on her own and as she affects her husband.

"Aviation is not just machines, engines, and planes. Aviation is people—men and women, boys and girls. On this basis women are the equal of men." Thus did Mrs. Carrie Disosway, of Iroquois County, Illinois, fire an opening salvo in her fight to attain aviation suffrage for the so-called "weaker sex."

"Men," she declared, "do not welcome women into their realm with open arms. Today's man is not going to give up his seat in the cockpit easily. He oft imagines that he is the man of the hour—the head of his own house. Don't be too harsh if he resents being co-pilot to wife."

Mrs. Disosway concluded by pointing out that we have been trying to sell aviation to the wrong person. "The hand that rocks the proverbial cradle is the party who usually decides on whether an airplane is to be added to the other farm equipment."

"No Bertram. That is *not* the gas tank."

"MEMBERSHIP IN FRIENDLY AOPA IS A GOOD BARGAIN!"

SAYS AOPA MEMBER A28507

EUGENE E. ALDEN

"Everyone likes a good bargain, and to me membership in friendly AOPA is just that. I value all AOPA services (Newsletter, bulletins, chart subscriptions, etc.) but especially the personal help of the staff in Washington. In the few instances I have sought counsel, AOPA's response has been immediate, their advice most helpful. Membership in AOPA is a 'must' for me."

Member Eugene Alden started his flying career in 1930 in an Axelson powered Travel Air and received his private pilot's certificate in 1936. To date, Alden has logged over 1200 hours and holds a Commercial Certificate with Land, Sea, Single and Multi-Engine, Instrument, and Flight Instructor ratings.

Eugene owns a Cessna 140 and flies mainly for pleasure but in his job as Chief Engineer of Radio Station WIRE in Indianapolis, makes several business trips each year. In spare time, he works as a flight instructor for the Indianapolis Flying Service.

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WING TALK

PRAISE FOR AIR RESCUE WORK

General Hoyt S. Vandenberg, Chief of Staff of the Air Force, has publicly commended the Civil Air Patrol, USAF civilian auxiliary, for its part in air search and rescue work during 1952. According to Brig. Gen. Thomas J. DuBose, commanding general of the Air Force's Air Rescue Service, CAP planes and volunteer pilots and observers accounted for 77 per cent of the total sorties and hours flown on searches in this country from January through November of last year.

General Vandenberg praised CAP as he made public General DuBose's report which also stated in part:

"Air Rescue Service has only eight squadrons consisting of some 46 aircraft providing search and rescue for the vast area of the United States. The ARS equipment consists of expensive-to-operate, multi-engine aircraft such as the Boeing SB-29, the Grumman SA-16, the Douglas SC-47 and helicopters. Without the support of CAP it would be a great expense to equip ARS with sufficient Air Force-type aircraft to permit adequate search coverage. Not only is the support of CAP less expensive, it also is in some instances more advantageous, as the slow, more maneuverable aircraft used by the CAP members are better suited for search purposes in certain types of terrain."

CAP today has more than 15,500 pilots, 2,400 observers and can put a total of 8,200 aircraft into the air in time of need.

APPROVAL FOR CAP-HIGH SCHOOL PROGRAM

A general aviation education course accredited by the Ohio State Department of Education now is available to Ohio high schools through the cooperation of the Ohio Wing, CAP. Though previously available as an adjunct to certain science courses, the course had met with only moderate success when offered on a non-credit basis. Endorsement of the program by state educational authorities is hailed as a major step toward placement of the course in official curricula. The text prepared by aeronautical educators under the direction of Dr. Mervin K. Strickler, aviation educationist with CAP's national headquarters, is being made available to Ohio schools through the Ohio Wing.

Study in the high schools will be aimed at cultivating air-minded citizens. A general knowledge of aviation and its influence upon society will be stressed with no intent to be technical or to prepare young people for careers in military aviation.

CALIFORNIA WING GIVES "OSCARS"

Not to be outdone by the Academy of Motion Picture Arts and Sciences, the Southern District Office of the California Wing, CAP, presented an "Oscar" to the outstanding members of the area at an affair held in the beautiful Los Angeles Police Academy. The selections were made when 47 unit commanders were asked to submit the names and background of male and female members who, in their opinion, were outstanding in their contributions to the CAP program. The candidates thus nominated were given numbers and their file was known only by number when it was submitted to a committee for final selection. Lt. Bert Pinckney, commanding officer of Squadron 43, was named outstanding male member. Capt. Ivy Kaufman, a member for nine years, was named most deserving of the honor in the female category. Lt. Frank Severy of Group 15 received a special award, a plaque, as the member who contributed the most during the past year in air search and rescue work.

Other special citations went to Maj. C. M. Meadors, Group 13; Maj. W. D. Hughes, Squadron 5; Capt. V. D. Perce, Squadron 111; Capt. L. J. Petritz, Squadron 5; Lt. A. E. Pierce, Squadron 111; Lt. S. Hauxhurst, Squadron 27; Lt. M. M. Phillips, Group 13; Lt. L. Backes, Group 16; and W/O C. Hetrick, Group 15.

* * *

Leo John Demers, son of the nationally-know crop-duster, "Ace" Demers, has joined the Salem Squadron, Massachusetts Wing.

The Tennessee Wing has an emergency fuel supply of 1,000 gallons of aviation gasoline on hand at Lovell Field, Chattanooga. The fuel was donated by a fuel company through the arrangements made by Maj. Ace Norris.

* * *

Requested by Air Rescue Service to aid in a mercy mission to Lime Village, Alaska, 150 miles northwest of Anchorage, the Alaska Wing flew in a medical officer from Elmendorf AFB to the isolated village where 13 persons were stricken by illness.

* * *

Civil Defense officials of Rockland County, N. Y., have commended the Spring Valley Squadron and its members for their participation in a recent CD exercise.

LT. FRANK SEVERY of California Wing's Group 15 receives a plaque from Col. Howard Freeman, California Wing commander. Lieutenant Severy was singled out as the CAP member doing the most for air rescue in the Southern District of California during 1952.

LOADING BOXES of clothing for flood-stricken Holland are (l to r) Cadet Sgt. John Bowling of the Hamilton Squadron, Ohio Wing; 1st Lt. William Chesser, squadron commander; and M/Sgt. Robert Nordstrom, squadron adjutant. The squadron offered to fly all clothing donated to the cause to the Greater Cincinnati Airport to be turned over to American Airlines for the remainder of the trip. The response was so great it took two days to complete the mission.

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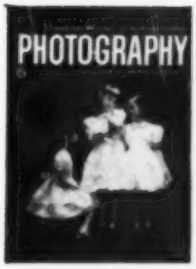

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AIRCRAFT OWNERS AND PILOTS ASSOCIATION

AOPA NEWS

Aircraft Owners and Pilots Association is a service organization for the private pilot or aircraft owner. AOPA's full time staff is devoted to helping the individual pilot. Its aim is "To make flying more useful, less expensive, safer and more fun."

Headquarters address is Box 5960, Washington 14, D.C. Members also receive a special AOPA edition of FLYING, newsletters and confidential aviation data. Opinions expressed in this column are not necessarily those of FLYING Magazine.

'DRIVE-IN' LANDMARKS

AOPA members have long contended that drive-in theaters are outstanding landmarks of great value to pilots, and should be shown on the aeronautical charts.

AOPA recently discussed the matter with Coast & Geodetic Survey officials responsible for the aeronautical charts and found them quite interested in considering the addition of a new symbol for drive-in theaters. They asked AOPA cooperation in learning from its members just how valuable such an addition to the charts would be.

A brief item in the last AOPA Confidential Newsletter brought a torrent of favorable comments from AOPA members throughout the country. Many sent National Headquarters charts on which prominent drive-in theaters were clearly marked. AOPA has sent those on to responsible C&GS officials.

Comdr. E. R. McCarthy, chief of the C&GS aeronautical chart branch, has now advised AOPA that the amount of interest shown by AOPA members in the charting of drive-in theaters has caused that Government agency to give serious consideration to the theater-marking project. If present plans develop, a special symbol for the theaters will be developed.

Other pilots interested in the project are invited to send their comments and marked charts to AOPA National Headquarters. Pilots marking charts should be as accurate as possible in pin-pointing the exact location of each drive-in theater, as C&GS does not at present have facilities for surveying the location of each site.

TRANSCONTINENTAL CRUISE

AOPA is giving technical assistance to the Philadelphia Junior Chamber of Commerce, and the national association of Junior Chambers of Commerce, in the planning and operation of their first transcontinental air cruise for stock model, single-engine (300 hp or less) civil aircraft.

The cruise, which is slated to start at Philadelphia April 25 and end at Palm Springs, Calif., on May 2, will follow a course through Pittsburgh, St. Louis, Tulsa, El Paso, Tucson, Phoenix and Blythe, Calif. Official airports have been designated along the entire route, and stops can only be made at those airports. Tulsa and Phoenix are the only two mandatory stops on the course.

AOPA helped the Philadelphia group make special arrangements with the CAA in Washington for the handling of the mandatory flight plans, and the timing of take-offs and landings. All officially-designated airports on the course have CAA communications facilities on them.

Anyone can enter any type of stock civil plane they wish, within the limitations of the rules. The great emphasis will be on normal cruising and careful navigation; every effort has been made to eliminate racing. Scoring will be based on the normal cruising performance of each plane, which will be handicapped accordingly.

The cruise will end at Palm Desert Airpark, Palm Springs, Calif., which is a popular resort airport. Prizes will be awarded there at a gala wind-up banquet and outdoor party.

Pilots interested in entering should contact J. H. Crumbie, Jr., Junior Chamber of Commerce, Philadelphia 3, Penn.

MIAMI FEE WAIVED

Both U. S. and Cuban non-commercial civil aircraft flying between the two countries under the new streamlined flight-notification system now will be able to land at Miami International Airport free of charge to comply with the requirements of U. S. Customs, Immigration and Public Health services for aircraft entering or leaving the U. S.

At AOPA's request, an already-existing rule at Miami waiving the standard landing fee for planes using the Federal facilities on that airport was expanded to include Cuban aircraft, and also to permit those aircraft to refuel while on the ground.

That basic Miami ruling has been in effect since August, 1950, following AOPA's successful negotiations with A. B. Curry, director of the Dade County Port Authority (which controls and operates Miami International Airport), to permit civil pilots to use the Federal facilities on that airport free of charge.

AOPA took up the matter of extending the ruling to include Cuban civil aircraft at the request of the Cuban Government, which had recently revolutionized its entire method of handling non-commercial civil aircraft—including the dropping of landing fees for such aircraft at all Cuban airports of entry.

Meanwhile, AOPA has proposed to officials of the new Greater Pittsburgh Airport—which has all the Federal air aids located on it, and which charges stiff landing fees to civil planes wanting to use those facilities—that they adopt a regulation similar to that adopted at Miami in 1950.

NEW ADMINISTRATOR

Fred B. Lee (AOPA 1585) has been nominated by President Eisenhower to be the new CAA administrator.

Lee is a CAA career man, and was deputy administrator during the regime of Charles F. Horne (AOPA 77197), whom he is slated to succeed. Lee is a former Navy man, is an attorney, and owns and flies his own *Navion*. He is a charter AOPA member.

My Biggest Thrill

(Continued from page 14)

of steel, working loose, had caused progressive failures in all four scavenger pumps. This meant that oil was coming into the engine under pressure, but it was not being pumped out again to the oil storage tank. Back pressure in the crankcase forced the oil out through the breather pipe, and it flowed down through the fuselage and found its way into the rear cockpit.

Armament Anguish

A test pilot who works military planes sooner or later has trouble with armaments. In 1942, during the initial tests on airborne rockets (I fired some of the first ones) we were doing low-level shooting at a mock submarine on the desert north of Daggett, Calif. At this stage, the rocket tubes were installed so as to pass down through the fuselage of our B-18.

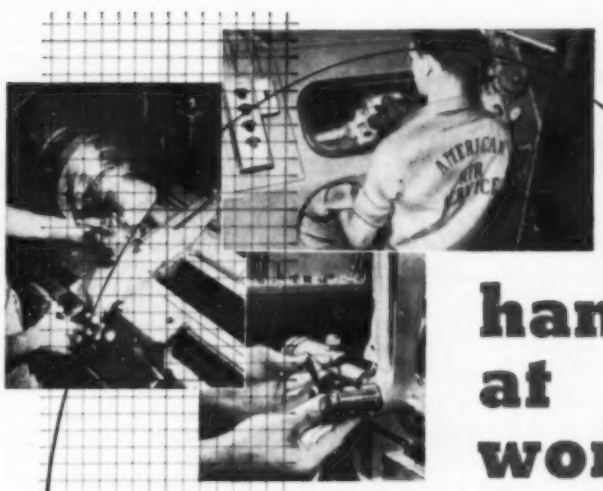
As I made my first pass with this arrangement (there were many others, too), all four rockets unexpectedly fired at once. They blew off the bombardier's escape hatch and the main door, which flew off and damaged part of the tail. At 100 feet altitude, a severe damage to structures like this usually causes a fatal crash. I managed to pull her up and nurse her back to the field, but many changes were made before we fired any more rockets.

Guns "cooking off" can give you lots of trouble, too. This happens when a gun gets too hot and fires a shell, or a shell explodes in the breech, *after* you think the gun is empty.

One of the worst experiences of my career happened this way, while testing an Air Force A-26 bomber one night off San Clemente Island. I had finished my tests and headed back toward land. Just as I approached the shore line at Newport-Balboa, a beach resort, a 50 cal. wing gun started cooking off. It was firing live ammunition into a populated area! I banked around and headed back out to sea; and as long as I was flying away from land, everything was peaceful and quiet. But the minute I turned back toward shore the gun started cooking off again. I was sweating like a mule driver. With the help of my emergency prayer I got back without anyone being shot up; but that was one test flight in which the population below was in far greater danger than the pilot. Since that flight, methods of test firing have been changed to eliminate such hazards entirely.

Here might be a good place for some explanation of what a test pilot really does. Certain movies and comic books give the impression that all we perform is power dives and spectacular acrobats. I wish some of those who dream up such misimpressions could spend a month with a test pilot some time!

The test pilot collects information that can't possibly be obtained from ground tests. He flies with a note pad strapped to one leg. He puts his ship through a series of carefully pre-calculated tests, and records data on every phase of its



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flight performance. A new ship isn't tested in a day, or a week. It takes months—years, in some cases—before all the bugs are worked out of a prototype and the services, or airlines, accept the ship for production and general use.

Some days a test pilot will do nothing but power-on stalls, or tight turns. Other days he will engage only in straight and level flight. He may even be assigned, as I once was, to test just one experimental item which has been installed on a ship.

Ten years ago I test-flew the X-C53, an experimental DC-3, for the purpose of testing and perfecting deicing heated wings, the type in use today on all our airlines. On the same ship I tested full-span flaps, which are now standard equipment on the Douglas C-124 *Globemaster*, the Air Force cargo and troop carrier.

This was rugged work. I took the ship into northern Minnesota and Canada. I was instructed deliberately to hunt out the worst possible weather. The deicing equipment still had major bugs; one (we found out later) caused the wing supports to all but melt from heat.

Skystreak the Pioneer

When Douglas began building ships to assault the sonic barrier, the first model was designated the D558-1, or *Skystreak*. Since I was to fly her, I was assigned to follow her through the engineering and building stages. This was to be of tremendous aid to me. It gave me an invaluable advantage in testing both the *Skystreak* and the real supersonic buster, the *Skyrocket*.

When the *Skystreak* was completed we trucked her to Muroc Dry Lake to begin her ground tests. The initial flight took place on a bright April morning in 1947. It almost ended in complete disaster.

Promptly at six a.m. I poured the power to her and took off.

I was airborne only a few seconds when I sensed a partial loss of power. Instinctively I nosed her down and landed straight ahead. When I hit the brakes, the left one (as we later found out) completely disintegrated. The D558 ships have tiny tires. These were only 20 inches in overall diameter, with a four-inch cross section, inflated to 190 pounds. With 11,000 pounds of airplane rolling at 200 mph, with the end of your landing space rushing at you, and with only one brake working, you sort of wish you had stood in bed, as they say in Flatbush. But with the use of full left rudder and right brake I managed to hold her under control. She drifted about 70° off her lakebed course and rolled to a stop in approximately two miles.

So, the first thing I learned was that the engineers had done a great job of designing the *Skystreak's* controls. Intimate knowledge of an airplane is a progressive thing, even after you have followed her through the building stages.

We found that the loss of power was caused by a partially blocked baffled port in the fuel tanks of the main pressure system. When the main power dropped off somewhat, the emergency system did not cut in automatically. It wasn't designed to. It took the engineers three weeks to correct the trouble, so that I could fly her again. Today's aeronautical engineers make no compromise with safety, no matter how minor the trouble may seem. Full safety is their ultimate goal.

As a result of this incident, and other similar ones in various military planes, all of today's jet aircraft have a completely different alignment in pressure ratios, in which the emergency pressure cuts in automatically the instant the fuel pressure falls off, for any reason.

Later on, while making speed passes at ground level in the *Skyrocket*, I had occasion to make another emergency landing. We were calibrating the air speed indicator. Just as I passed the tower, doing around 600 mph, at 75-foot altitude, all four fire warning lights lit up on my instrument panel. That meant trouble—or was supposed to.

I pulled up sharply, banked around and headed back for an emergency landing downwind. The *Skyrocket* was a heavier ship (15,000 pounds) and my landing speed, with the wind behind me, was about 240 mph. Just as the wheels touched the ground I felt a terrific jolt. Blowout—right tire. As before, I used full opposite rudder and brought her to a stop in a couple of miles at about a 75° drift off course.

The fire warning lights? They were caused by nothing more sensational than a short circuit in the system. But on examining the damaged wheel we found a hole completely through it, made by a rock.

I confess that nothing meant more pure joy for me, after spending so much of my time collecting dry data, than to cut loose across a flat stretch of desert, knee high to a pack rat, and watch the real estate passing beneath me faster than sound travels. Speed at high altitudes is not as hair-raising as you may think—even supersonic speed. But at ground level it's a vastly different story! I have already said that as far as I can determine I have flown faster at ground level than any other human. For real fun, I don't think that experience can be topped.

The Big Test

By the time I was ready for my first supersonic flight in the *Skyrocket* I had flown a great number of hours in it, and in its prototype, the *Skystreak*. Structurally, I don't think two stronger ships were ever built. I put them both through tests rugged enough to break up completely any other ship I ever flew. I think it is worth mentioning again that neither ship ever had to undergo any changes in design as a result of high speed tests.

That is why I approached my supersonic tests in the *Skyrocket* with utter confidence in my ship. Based on what we had learned from the *Skystreak*, the *Skyrocket* had been built specifically for supersonic flight, with swept-back wings and auxiliary rocket power. Whereas the *Skystreak* only knocked boldly at the door, the *Skyrocket* was made to bang right through.

There were plenty of frightening myths

about the sonic barrier. Many aviation experts honestly felt that the shock wave would be like hitting a solid wall, far too tough for any airplane; and, true, some men had already met violent death in the attempt to go through it—in ordinary aircraft. But the "*Rocket*" is no ordinary ship. She is tougher than any solid wall. She is so well tailored for her job that any pilot who is reasonably well trained in handling hot airplanes could fly her through the sonic barrier on his first try.

I took off without rockets, preserving precious fuel for my test. At a high altitude I levelled off. On the ground, radar stations stood by to track me through the run. They radioed me they were ready.

I was ready, too.

I backed off some 20 miles and started in. I got every last ounce of stuff from the jet, and that was considerable. Then I cut in Number One rocket. I felt a walloping pickup. My air speed indicator took a big jump. I was already knocking on the wall. On a sudden impulse I decided to get it over with and kicked in the other three rockets all at once.

The acceleration hit so hard it flattened me against the back of my seat. Suddenly the ship rolled sharply left. I compensated. She rolled right. I compensated again. She climbed sharply. Again, I corrected. Now she trimmed up perfectly. That was all the shock there was. After that, the flight got glassy smooth, placid, quite the smoothest flying I had ever known.

I glanced at my instruments. They were all bouncing around. I could feel a constant acceleration, and I knew I was now far in excess of the speed of sound, far beyond the barrier. I had felt no shock. But the pressure distribution on the airplane was now far different than at subsonic speeds. Despite the smooth flight, ordinary maneuvers took twice their normal work in pounds of human force required.

I sat back and took a deep breath, gratified (though not surprised) to note that I was still alive. Now that the ship was stabilized I checked my reactions. Felt fine. So far, a most pleasant experience.

One of the reasons the plane was more work to control was that I now felt very light. It seemed as though I weighed only half my normal weight. That may mystify the sticklers for scientific accuracy, but nevertheless it was true—to me, at any rate. And I felt that way every time thereafter that I flew through the sonic barrier. I seemed to be coming half way up off my seat, though I was in dead level flight. And still accelerating. How those rockets love speed!

Soon they spent their fuel. Now I was quickly decelerating, going back down through the sonic barrier. I experienced again the transition—NOT turbulence, as I often hear it called—between the supersonic and subsonic which alters the inherent stability of any aircraft. Again she rolled sharply, first one way and then the other. Gradually, my instruments regained possession of their senses, the ship

(Continued on page 54)

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(Continued from page 53)

became lighter to control, I became heavier again, and I was back in the world I had left a scant three minutes before. I felt exhilarated, exultant, like a guy who has just scored on a 95-yard punt runback. I grinned with satisfaction—and relief. When I learned later how fast I had gone, it confirmed my faith and everyone's faith in the *Skyrocket*. This was an airplane that literally astonished the civilized world.

(Editor's note: Official Navy-Douglas releases say the *Skyrocket* has flown at an altitude of 79,494 feet, and has hit an announced speed of 1,238 mph.)

First of Many

Well, that was my biggest thrill. It was followed by a long series of supersonic flights, as mankind started to compile some first-hand knowledge of the transsonic region. All this came as a fitting topper to a lifetime of satisfaction and thrills in flying. All the excitement and fun of testing the *Skyrocket* was such a natural clincher to a long career that I couldn't think of any good reasons why I shouldn't quit flying forever and get into a business on the ground.

The more I thought about it, the more sense it made.

Today, as vice president of the Superior Cutter Company (we manufacture metal cutting tools), I hardly ever take time to think of flying. Haven't been up since I hung up my crash helmet a few months ago. But I do confess I have one recurring daydream.

I'd like to buzz Sunset Boulevard in the *Skyrocket* at full throttle, all four rocket tubes wide open, at about 40 feet altitude. Wouldn't take me more than a few seconds. After that, I would cheerfully leave all the flying to my three sons and four grandchildren. END

No Way Out

(Continued from page 30)

The sun was setting—no one knew of our whereabouts. We had a meeting of the minds on shore and while discussing our predicament I had an idea I felt sure would work. I dashed into the water and scooped sand from *under* the left wheel. The plane settled until practically all the weight was on the hull.

I crawled into the cockpit—cold, exhausted, hardly daring to touch the retracting crank. It worked! The weight was on the hull now and the wheels retracted.

With the plane on a more even keel, I started both engines and taxied to deeper water. Again we used the collapsible boat, and the passengers climbed aboard. In a matter of 30 minutes we were touching down on the waters of our base lake with just enough light left to make a landing. Fifteen minutes later and it would have been too dark to find that lake!

We had a close call and now more than ever before I respect Canadian bush flying—and all its tricks. END

A Skipper Looks at His Ship

(Continued from page 29)

Pilots' Association, headed by Capt. Fred Austin of TWA. Tests were run on the 1049 with one engine automatically feathered at V_1 speed, and the *Super Connie* climbed out on three engines to 13,000 feet, easily meeting the "T" category requirements.

Another visible change in the 1049 is an increase of about two feet in the height of the vertical stabilizer. Larger square windows have been used in the cabin, with double panes which can withstand the pressurization independently. A new method of boost control has been utilized in the rudder. The "trail center" system has resulted in better control, less "hunting" of the rudder at high speeds, and smoother directional action while flying on the electronic automatic pilot.

Pilots appreciate the extra space provided by raising the fuselage behind the windshield. The larger windshields of flat, undistorted glass increase visibility above the horizon, although there is still considerable restriction below the horizon. Electric "Nesa" deicers are imbedded in the windshields with a separate power source built into the electrical system to operate them. For those still a bit skeptical of this type of deicing, alcohol also is provided as an alternate deicing method.

One of the new gadgets, and a smooth working adjunct to airline operation, is the Hamilton Standard automatic propeller synchronizer. The four propellers are kept in constant synchronization, with automatic corrections made before any prop gets more than one per cent out of phase. Rpm changes can be made without the annoyance of prop "beat." Automatic propeller feathering is available, although not mandatory unless the take-off weight is near 120,000 and the runway a bit short. The propellers are reversible and the scissor switch is so arranged as to permit reversing while the nose wheel is still in the air.

Wright CB engines have been installed in the 1049's delivered to the airlines. These engines are an improved version of the earlier "3,350's" with a take-off power rating of 2,700 hp achieved at 2,900 rpm and 52.5" manifold pressure. Presently TWA is recommending 1,325 hp for cruise, and good performance has been found using 1,600 hp cruising and gaining about 25 mph air speed.

The 1049 cruises at 310 true air speed at 25,000 utilizing less than 50 per cent of available power. At 60 per cent power the cruising speed is about 330 mph. Fuel consumption is slightly less than 500 gal. per hour, and at long range cruise gas for more than 14 hours can be carried. In addition to the 5,870 gallons in the wings another 700 gal. tank has been installed in the 1049 fuselage, and a range of more than 4,000 miles is achieved. Very little trouble has been experienced with these CB engines, as they are now in their fourth stage of development.

Initial operation gave some difficulty with the jet assist exhaust stacks, but the source of this trouble has been located and the engine has been very reliable.

These short "jet" stacks relieve back pressure and actually add about 15 mph to the cruising speed, at the expense of being somewhat noisy. This will be cured with the compound engines.

Fully Air Conditioned

The best cruising altitude is around 25,000 feet, and the new cabin superchargers keep the interior at a comfortable 8,000 feet. A change of air is assured every three minutes in the cabin, and proper temperature is kept although outside air may vary from 120° to −60° F. The two superchargers are engine-driven in the outboard nacelles, and have a cooling capacity equivalent to 19 tons of ice, exacting a penalty of 170 hp to drive their impellers. To complete the air conditioning in the 1049, two gasoline heaters are available to generate 250,000 BTU's, enough to heat five ordinary houses.

During 1953 the Wright Compound engine is expected to be available to the airlines, and incorporation in the 1049C will give a boost to the performance of the *Super Connie*. The first 1049 with compound engines was flown in October, 1952, the plane being built for the U. S. Navy. Release of 1049C's for commercial use is contingent upon military demands. The compound 3,350″ engine is rated at 3,700 hp for take-off and a gross weight of 150,000 lbs. is anticipated for this added power.

The most interesting advantage of the compound engine is the specific fuel consumption of .39#/hp/hr — 20 per cent lower consumption than the conventional aircraft engine. This new efficiency is gained through utilization of exhaust gases to drive three small turbines which in turn add power to the crankshaft of the engine. Translated into terms of mileage, the fuel needed to go 1,000 miles will drive the 1049C 1,200 miles; or, calculated in weight of fuel savings, another ton of payload can be carried.

Speculation on retirement of our American propeller driven transports by British jets has been given wide play in the press. Before writing off these planes a bit of comparison in actual operating experience is in order. Certainly one of the greatest drawbacks of present jets is their limited range and terrific fuel consumption—as high as three or four times the fuel weight is required per mile of operation.

Economics Considered

The present schedule between London and Johannesburg, flown by the *Comet* at speeds nearing 500 mph, requires 23½ hours elapsed time and five stops for fuel. The *Super Constellation*, with its terrific range, could make the trip in less than 20 hours, needing only one en route fueling stop. When considering the operational problems of an airline, speed alone is not the controlling factor, and the ability of the 1049 to carry more than twice the payload of the *Comet* cannot be dismissed by those responsible for an operation that is economically feasible.

One of the jobs made to order for the *Super Connie* is a coast-to-coast non-stop flight here in the United States. When loaded to 120,000 lbs. and taking off from Los Angeles for New York, the first landing that could be made—allowing for fuel burn-off to 98,500 (the maximum landing weight)—would be in the vicinity of New York. Considering the speeds used in present schedules, a non-stop operation would require less than eight hours eastbound and a bit over 10 hours westbound. Among the interesting possibilities of this operation would be a chance to utilize fully "pressure-pattern" flying; wide latitude of choice of routes to avoid storm areas, and the higher cruising altitudes available when no intermediate stops are scheduled.

The present 1049's have a seating capacity of 67 for the first class transportation. Provision for eight berths has been made, and a lounge has been set up in the rear of the plane with eight extra seats which are not sold. With a high density seating arrangement, at least 100 passengers can be carried in domestic operation and about 85 in transatlantic service. The direct operating costs figured on a ton/mile basis point to the possibility of better economy for the Tourist flights to Europe. One of the many economies afforded by the 1049 is the insignificant additional pilot pay for flying the 1049; the cost to the company is only 38¢ per hour more than pay for flying regular *Constellations*.

Operating the 1049 on ILS and GCA is much the same as the preceding models, except that allowance must be made for stalling speeds. From 145 to 155 indicated airspeed is generally a good approach speed and crossing the boundary at 135 gives about the right "flair-out" speed. The 1049 stalls at 136 mph no flaps at 129,000 lbs.; with full flaps and gear down it will pay off at 108 mph.

To meet the CAA "T" category, a runway length of 6,730 feet is needed for take-off and a minimum of 5,555 feet is required for landing. Full use of the reversing feature in the propellers cuts the landing roll to less than 3,000 feet, and is a prime safety factor for wet or icy runways. Many earlier models are now being modified to reversing props, in recognition of their value.

Pilot Praise

Pilots flying the *Super Constellations* are enthusiastic over the increased handling stability, better visibility, greater range, and the better pressurization and ventilation. It is felt that conversion to the Wright Compound engines with 3,700 hp for take-off will make a real performer out of the 1049—that is, providing so much weight is not added that we wind up with the same power loading now present in the 1049. It is hoped the 1049 will also be modified to conform to the braking system standardized in all other models. To park the brakes properly a rather complicated sequence manipulation is required, and the possibility of their becoming unparked makes chocking the wheels necessary at every stop.

Certainly we have a new and efficient airline transport, one that will be flying the world's airways for many years to come, and one that won't be made obsolete by any jet transport flying today. END

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Silent Flight

(Continued from page 21)

gain of 16,400 feet, distance of 310 miles, and flight to a predetermined goal at least 186 miles away. At present, only half a dozen pilots have completed diamond "C," although many have won individual legs. Incredible as some of these performances may seem, they are far short of the absolute records: 43,000 feet for altitude, 545 miles for distance, and 56 hours for duration.

Basically, gliders and sailplanes are like conventional aircraft—or airplanes without engines—a fact that causes many power pilots to underestimate them badly. So close is the relationship that some powered aircraft now flying used to be gliders, and during the war some powerplanes were converted to gliders. In general, gliders are built with different proportions and weight distributions than airplanes, and as a result have greatly different flying characteristics. Flying 10-second circles in a ship with the span of a twin Beech is something that a powerplane pilot has a hard time believing even when he is riding as a passenger; and keeping the ball centered with fully crossed controls when in a tight turn is a characteristic of high-aspect-ratio wings with large ailerons that takes some getting used to.

The low flying and sinking speed of the gliders is something else they find hard to accept. The author had a former B-17 pilot, taking his first glider ride, tell him that the airspeed indicator in the back seat was broken because it was only registering 40 mph with the ship on tow! On this same flight, the B-17 pilot asked how much altitude was lost in recovering from a stall, and was given a demonstration. The 30 feet shown on the altimeter left him bug-eyed, but it was the landing that got him. We turned final at 250 feet, and touched down a minute and a half later and a full mile away, stopping within 100 feet. He climbed out and promptly made arrangements for rides for the rest of his family.

No Time to Relax

The absence of a powerplant makes planning and judgment pay off on every flight, not just in competition. The pilot has to think way ahead of his ship. Once committed to a landing, he has to go through with it, for there is no throttle that he can push to get him over the fence, or to take him around again if he has misjudged. Non-pilots may regard these limitations of gliders as a liability, but actually they are an asset. Glider pilots as a whole are much more aware of their own limitations and those of their aircraft than are many power pilots, and they stay within them. The variables that are encountered on each flight prevent even the short around-and-down hops from becoming mechanical. In a glider, the pilot is flying the ship every second, not just riding along in it. This premium on alertness and judgment may partially explain the attraction that glider flying has for many pilots who fly large ships professionally.

SOARING CHAMPION

William S. Ivans, Jr., pictured on this month's cover, first tried unpowered flight in 1947 as a member of the San Diego glider club. He has since accumulated 350 hours in sailplanes, in the course of which he has won single-seater international records for absolute altitude (42,100 feet ASL) and altitude gained (30,100 feet above release), both achieved in a flight from Bishop, Calif., December 30, 1950. The altitude record won for him the 1950 Lilienthal Award for the world's outstanding achievement in motorless flight. He is one of the few holders of the Diamond "C" soaring badge.

Evans, who also has logged 300 hours in powered lightplanes, is chief electronics design engineer for Convair in San Diego.

Evans' sailplane, a Schweizer SGS 1-23, is an all-metal, high performance craft equipped with oxygen, a two-way VHF radio, insulation for high altitude flight and blind flying instruments.

From the safety standpoint, gliding has grown up, and has divorced itself completely from the reputation that it had in the early '30's for irresponsible piloting in back-yard designs built from apple crates. Today, regulations governing glider airworthiness and pilot proficiency are as thorough as those covering powered aircraft. As in powered flying, the student must have a student permit, which he can get at 14, but the requirements for a private license are not hard to meet. The private glider pilot must be 16 years of age, have logged 150 flights, at least 25 of which include a 360° turn, or he must log 50 flights and 10 hours of glider time, at least two of them solo. A commercial requires 250 flights or 125 flights and 25 hours. Private power pilots can get a private glider rating merely by passing the proficiency requirement and a commercial power pilot can get a glider commercial as an additional rating merely by getting checked out and passing the commercial flight check.

Because of the absence of commercial connections, gliding is a hard activity for an individual to get into; entirely on one's own, it is impossible. The interested party cannot, except in rare cases, go to an airport, lay down his money, and buy himself a glider ride or instruction, nor can he take his pick of new or second-hand ships, buy one, and start flying it himself. It is not a case of price, it is a matter of limited availability of equipment and the assistance necessary for a glider operation.

Club Is Key

Most of the 400-odd gliders (449 by latest CAA figures) in this country are owned by clubs, and the usual method of getting glider time is to join one. This entails buying a share of the ship, which in most cases runs from $30 to $100, paying the cost of the tow and a nominal flight fee for each hop to cover maintenance and depreciation costs, and contributing manpower to the operation. This last item is the key to the whole program, for a glider

pilot, even though he may always fly solo, cannot fly unassisted. Someone must be on hand to launch him, and in most cases where the ship is brought to the flying site on a trailer, he needs help in setting it up.

As a result, most clubs that have instructors do not charge for instruction. The student pays for his lessons by helping the instructors and the others with their own flying. Obviously, club membership is practically a must for the beginner from the operational standpoint, and a great help from the financial in that he does not have to meet the full cost of a ship by himself. There are active glider clubs in all parts of the country and an interested person should have little difficulty in finding one nearby

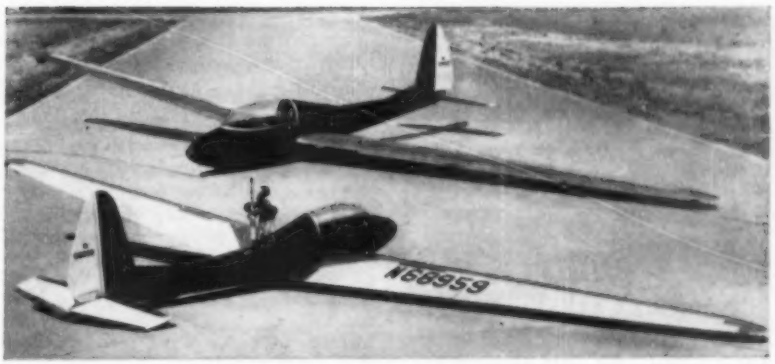
Most of the ships owned by clubs today are war surplus two-seaters. Just before the war, the Army initiated a glider training program, starting with outright commercial sailplanes and slight adaptations of them. The performance of these was too superior to that of the boxcar cargo types that the pilots were to use in combat to make them suitable as trainers, so they were declared surplus in 1943. Army glider training was then given in standard 65 hp lightplanes from which the engines had been removed, resulting in performance more nearly matching that of the cargo ships.

The appearance of these medium performance (23-to-one glide ratio and three-foot per second sinking speed) sailplanes on the market at surplus prices was the only thing resembling a subsidy that U.S. gliding had ever seen. Before the end of the war, fully equipped two-seaters were selling for about $500, and even in 1946 the same ships, modified to meet commercial licensing requirements, were going for between $600 and $1,000.

About 450 of these military ships were sold, and while they were a welcome windfall to the existing group of soaring enthusiasts, their long-range effects on the movement were not so good. They were big and heavy and definitely awkward for an individual to own, and they were not light enough on the controls to make really good primary trainers. The Army pilots who flew them could fly before they went into the glider program, and were not hindered by the fact that learning to fly in a glider using ground tows is a slow job. However, their ruggedness suited the ships to club operations, and even now, 10 years after they came on the market, most of them are still around. Most gliders are not lost through crashes—they just wear out.

Despite the apparent fragility of some of the older all-wood designs, gliders do seem to last forever. Many 1935 products are still being flown regularly. This is due to the fact that the average glider gets very good care. In most cases, the ships are dismantled after a week-end of flying and are placed on their trailers and stored indoors. Very few are staked out in the weather. This disassembly has further advantages in that the ships can be taken home and stored in the garage or, if kept at the airport, several can occupy

(Continued on page 58)



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(Continued from page 57)

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Industry Thwarted

One sad effect that the surplus ships had on soaring was to jerk the rug right out from under the tiny glider industry. Several of the popular prewar designs were still available in 1946, but they couldn't compete with surplus in the existing market. New design took a beating, too, and at present there is only one manufacturer producing standard postwar designs, although there are others who turn out custom jobs.

Just before the war, there were several kits on the market for NC'd glider designs that could be built at home, the single seaters selling for between $250 and $500, depending upon the degree of prefabrication desired. Today, kits for a single-seat utility type, and plans for home building, are available.

In an era of skyrocketing prices, glider costs have remained relatively stable since the end of the war. Most of the war surplus two-seaters can still be had in good condition for between $600 and $1,000, and ships needing quite a bit of work, possibly a recover job, can be had for as little as $200. Prewar wooden sailplanes like the Bowlus *Baby Albatross* and the Americanized German Goppingen *Wolf* bring between $500 and $700 in first class condition. The cost of new production types is higher, but still well below that of most personal power types. The high-performance all-metal Schweizer 1-23 tops the scale at approximately $3,000, the 1953 price of a popular single seat lightplane, and the two-seat 2-22 trainer is $2,500 new and between $900 and $1,300 used. The single-seat 1-19 utility is $1,500 new and between $300 and $700 used.

There is a much greater variety of types, ranging from primaries to world championship sailplanes, available in the foreign market. Because of greater production, the cost of some equivalent models is lower, but this advantage is offset by the shipping costs and import duties necessary to get them delivered in this country.

There is one other source of gliders that is very appealing to technically minded people, and that is in the field of original design. In spite of the exacting regulations that now apply, it is possible for a competent amateur to design and build his own ship, and to fly it without too much limitation. The main concern of the CAA in such cases is for the protection of the public, which includes the pilot, and as a result it is very insistent on sound structure and especially on the quality of materials and workmanship. Such ships can be given airworthiness certificates in the limited category, which means no passengers and no commercial operation. Since these types are invariably single-seaters designed for sport and amateur competition, such restrictions are a very small hindrance.

The equipment necessary for glider operation is considerable, and here again club ownership is an advantage. Depending upon the nature of the operation and the terrain, the towing equipment will consist of a car, a winch, or an airplane in the 100 to 400 hp range. On mile-long fields, a car or winch can tow a glider to altitudes of about 1,000 feet for 20 cents a tow, and airplane tows average a little over a dollar per thousand feet. Since the cost of the tow is the same whether the flight is short or long, the cost per hour to the pilot is determined by the experience factor as he increases his ability to stay in the air under a given set of conditions. Winch and auto tows for high flights are usually made using $\frac{1}{8}$" steel wire, which is cheaper than $\frac{5}{16}$" rope, and easier to handle in bulk. Short training tows are made close to the ground at the end of a couple of hundred feet of rope, the ship staying on the line while a car tows it the length of the runway.

Basic to DeLuxe

Once the essential towing equipment and aircraft maintenance tools are on hand, the sky is the limit on flight equipment. Barographs are essential if you want your flights recorded for purposes of award, and if you are going after altitude and distance records, oxygen systems and two-way radio are musts. In this respect, gliding is like photography—you can go overboard on equipment, but the guy with the Brownie camera and the guy with the low performance utility ship and no instruments at all can have just as much fun, each in his own private sphere of operation.

Gliding is an activity well suited to full family participation, and there are many families in which both husband and wife are pilots. There are practical aspects to this, too. The family serves as Pop's ground crew; helping him set the ship up, and following him on the ground with the car and trailer to retrieve him after a cross-country or a goal flight. Even when the activity is confined to local flights close to the field, the "family outing" atmosphere prevails. It is generally an all-day affair, with picnic lunch, and there are usually other pilot families around to make things sociable—which is a very good thing, as sweating out the five hours for Silver "C" can sometimes be a lot harder on the ground crew than it is on the pilot.

Any sport takes time, costs money, and has its share of troubles. But soaring—sailing in the sky on the wings of the wind—is the supreme sport of all, and leaves earthbound problems far below as the pilot, whether he be champion or beginner, rises to meet the challenge of the forces of nature. END

If You Check It

(Continued from page 22)

He seated the gascolator clip securely in its holder and to make sure it would stay there, lashed it in with brass safety wire. I have seen this done since (as a matter of routine) on other planes, and I must say I think it is worth doing.

Another time a walk-around visual saved me grief was in El Paso. After I

landed, the tower radioed instructions to me to taxi off the runway to avoid some freshly-laid asphalt. I pulled off into the grass for about 200 feet, then came back onto the runway, and thought no more about it. Next morning, however, when I was preparing to take off for Del Rio, I made my usual visual check and noticed that the tires suddenly seemed to have developed a case of chicken pox. They were peppered with hundreds of queer white dots. I bent closer and dug at one of the white dots with my thumb nail and out popped a tough, vicious-looking thorn about ⅜-inch long. A pilot was tinkering with a plane nearby and I called him over and asked him what had happened.

"Oh, those are bull stickers," he said. "Those little rascals will disappear in the rubber after a few landings and gradually work through the tire and cause a puncture. Lucky you noticed them. We usually use puncture proof tubes around here —just to protect ourselves."

It took me two hours to dig out every individual thorn, but I took the time, and did the job right. If I'd been a hop-skip-and-away pilot, I'd never have noticed the bull stickers, and sooner or later I'd have had a flat. A flat tire, in an airplane, can cause a ground loop if it happens at the wrong time—and a ground loop can tear up a wingtip if it's severe enough. I think it pays to check—even the surface of your tires.

I personally give my gas tank caps a final twist with my own hands ever since the time a gas truck operator left my tank cap off in Columbus, Ohio. I didn't find out until I landed at Wheeling, W. Va., that the cap was gone. Then I tried to borrow a gas cap from a man who drove up in a car. He was going to give me the one off his own tank, which happened to fit, and I'd have used it if the local A and E (I'll always love that guy) hadn't pointed out that the automobile cap had no vent hole in it. Without the vent hole, the A and E explained, there would be a vacuum built up inside the tank as the gasoline was used out of it. As soon as the vacuum got strong enough, no gasoline would flow to the carburetor and the engine would stop. Wow!

If you rent a plane, a walk-around visual is even more important than when you own your own plane and are able to keep track of maintenance yourself. Some operators take good care of their equipment. Some don't. The only way to protect yourself is to take a good, long look yourself, and know what to look for. In the old days when I was young and foolish, I used to let myself be shamed into doing dangerous things just because some hanger-on around the flight line snickered at me for being a timid soul. I flew a lightplane once which was detonating so badly on take-off that the whole fuselage shook, just because the instructor said: "Ah, stop worrying. These engines never quit." This engine did quit, however, four days later, and a student wrapped the airplane around a tree in the subsequent forced landing. Luckily, he wasn't hurt.

I've learned through experience that all the hot dope you pick up in hangar flying sessions should be carefully evaluated before being put to use. Some of it can crack you up. Like this business of going up and shutting off the engine and stopping the propeller and making an honest-to-john forced landing for the practice. I'd try this over Muroc but I certainly wouldn't try it over some small grass field, particularly if there were wires to contend with. A real forced landing is no joke and, to my way of thinking, it's silly to expose yourself to one if you don't have to.

Rules of Thumb

Here are a few basic rules which I've tested and proved to my own satisfaction, and they are yours if you like them:

(1) Change the oil frequently. It's the cheapest life insurance you can buy.

(2) Cruise on the low side of the rpm limit. Engine wear increases exceedingly rapidly in the last few hundred rpms.

(3) On a busy airport, make your complete checkoff list *before* you get to the end of the runway. Then make your mag check, your carb heat check, and the test for freedom of controls *a second time*, just prior to take-off. On a big airport it's easy to get pressured into rushing the plane into the air. If you've made your basic checks thoroughly back on the line, it isn't going to matter too much whether you get rushed or not.

(4) When flying cross-country, don't sit there fat, dumb and happy. Know where you are. Then, if an emergency arises, you can head for the nearest airfield instantly, without frantically trying to locate your position on the map at the same time you are trying to deal with a malfunction of some sort.

(5) Keep on the alert for carburetor ice in damp, hazy weather. Drop in rpm will tip you off—or, if you have the plane trimmed for level flight and she starts losing altitude, that will also often mean carburetor ice. The thing to do, when you get it, is to give the heat a full-on position, pull the plane's nose up and ease the throttle wide open. Make the engine labor, and pour as much gasoline in as you can. Do not dive the airplane.

(6) If you have a forced landing, there are two very important things to remember. First, aim for the *middle* of the field you select. Not the first third. You can always slip off the extra altitude, but you can't stretch a glide. Second, try to establish some sort of *down-wind* leg. The down-wind leg gives you maneuvering space; you can always cut it short or extend it.

(7) If you notice something that *smells* different, *feels* different or *sounds* different in your airplane, investigate it. Don't just shrug it off and forget it. The time it takes to run down a suspicious indication of trouble is time well spent, even if you find it was only a fly trapped in a coke bottle.

Flying is a lot of fun. I wouldn't trade it for any sport in the world. It is also very safe, provided you don't get careless, reckless or stupid. Remember that you can be the best pilot in the world, and still have trouble if the airplane doesn't do its job. Check it—and you won't wreck it! END

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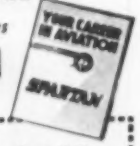

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Private Flying In Morocco

(Continued from page 27)

tractable, tricycle gear and flaps. Many other privately owned airplanes of all types—both American and European—are kept in the Club hangars.

Without further ado, I paid the membership fee and thus was the way opened for many pleasant afternoons, both in the air and on the ground.

It was several weeks after this first encounter with civilian flying east of the Atlantic before I was able to return to the field. Meanwhile, however, having learned more about the layout of the city, I realized that the airport and the Club were little more than a five-minute auto ride from my hotel in the center of town. This, said I to myself, must be heaven. Nowhere else could anyone ever build an airport in such a reasonable location; so convenient for the ordinary, hard-working private pilot. Many weary hours of riding buses, hitch-hiking, taxi-ing and utilizing every obtainable method of transportation to get to airports in the U.S., as far as 10 and 20 miles from town, had long ago forced the belief upon me that it must not have been intended that man should fly after all.

There was no doubt about it, however. This airport was a literal fact. Located just outside the city wall, it was within walking, bicycling, or donkey ride distance from the central area of the town.

Precision Required

When I came out for my first flight I was told that, notwithstanding my U.S. commercial pilot's license, I would still have to check out with their instructor, then go through their test for a French license. It took me two attempts before they would let me solo. I blame the first try, naturally, on a strong cross-wind and a year of non-flying. After soloing, the requirements for the flight test for the license were demonstrated. I was then told that I would have to go through the same maneuvers with a recording barograph in the front seat of the *Cub* to show how much my flight would deviate from the required precision minimums.

Briefly, the flight test was as follows: Take-off and climb to 400 feet, turn left 90° and climb to 800 feet; turn left (downwind) and climb to 1500 feet; turn left 90° and climb to 1800 feet; turn left (upwind) and climb to 2100 feet, at which point the airplane should be over the center of the runway. Cut back the engine and put the airplane in a normal glide; turn left 90° off the runway; turn left (downwind); turn left (base leg); turn left on final; land on the spot at the center of the runway which the plane was directly over when at the height of the climb. Take-off and climb to 300 feet; turn left and proceed at this elevation to the site of a race track near the airport; fly five complete figure 8's inside the overall area of the track, maintaining constant elevation, and maintaining constant distance from the center point of the turning circle, just as we fly pylon 8's at home; return to the runway and land. The barograph must show steady and regular climbing and gliding, and not undue deviation in altitude when maneuver calls for level flight.

The following week I came out to take the test. Even though the practice flights had helped to iron out some of the nervousness inherent on such occasions, there was still a fair amount of muscle tenseness evident as I went through the procedure. Came the final trip around the pylon, the return to the field, the final landing. The instructor came running to take out the barograph—and me with it—and put another student in the plane. One look at the barograph confirmed my worst fears—it was just a white sheet of paper! I must have flown the wrong course. A second look clearly indicated that the gadget had stuck and failed to function. I had, therefore, completed a much needed practice flight and, to the chagrin of the other student, was allowed to go through the entire maneuver once more. This time the little needle went its appointed way, the instructor said "Voila," which I interpreted to mean, "It'll do." Three weeks and six certified documents later I received a little book in the mail which said in no uncertain terms that I was a Pilote D'Avions de Tourisme, 1st Degree.

Pilot's Utopia

There are many interesting spots in Morocco; in fact, it is a country eminently suited for the tourist who would like to visit a land that is something out of the ordinary, a combination of the ancient and the modern. Native skills thousands of years old, passed on from father to son for generations, may be seen alongside modern methods of manufacture. Morocco is no farther from the U.S. than England, yet it is completely different from England and Europe in every way.

All the major towns and cities have excellent hotels, and these towns and cities may all be reached by air. There are many emergency fields and landing spots, though only the larger cities have airports which can supply hangar space or even refueling facilities. It is a country of plains and mountains and desert, blessed with pleasant temperatures most of the year. Some sections have periods of extremely high temperatures in the summer with virtually no rain—none, that is—from June to November. Even during the

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wet season—November to April or May—there are very few of the non-flying days that usually are recorded along the Eastern coast of the U.S.

The plains area between the ocean and the Atlas Mountains, which is used largely for grazing cattle, sheep and goats, is a grassed area in which a lightplane at 2,000 feet altitude can find an emergency landing spot almost any time. The result is a set-up that many lightplane pilots dream about but never hope to see. END

Flight of the Southern Cross

(Continued from page 35)

Twelve hours later they had climbed to 4,000 feet to get above the clouds into the light of a full moon. At 12:17 p.m. on June 1, they landed at Wheeler Field, 2,408 miles along the way, after an essentially uneventful trip. What lay ahead was something else again, but it was impossible to foresee the raging hell of storm coming up from the Fiji Islands.

On June 2, they flew 100 miles to Barking Sands Beach on Kauai, and took aboard 1,300 gallons of gas. Runway conditions were ideal at 5:22 a.m., June 3, and the old Fokker surprised them when, with Ulm at the controls, she lifted off at 3,400 feet.

An hour later they began their 30 hours of ordeal. A front extended deep and full across their flight path. The overloaded Fokker was so close to the stalling point that instruments were ticklish. They couldn't detour. If they tried to climb on top, their cruise control was shot and the increased rate of gas consumption would have ended their chance of reaching Suva.

They went under, wheels sometimes almost grazing waves of mountainous size, with a rain hammering the windshield. After several hours at wave top level they broke free and climbed to 1,500 feet. They were able to by-pass two additional fronts, but wasted gas, and finally got trapped in cloudy, rain-filled turbulence that shook "The Southern Cross" severely.

The storm hammered them back to 500 feet in lowering darkness and the fabric popped with a drum-like cadence. Tons of water finally split the windshield and drenched the pilots until they were numb with cold.

This went on for 12 hours, until everyone was exhausted and the pilots together were fighting to hold the controls. They blistered their palms and grew numb in their legs. Then conditions got worse, and they had to use precious gas for full power in an attempt to get on top and survive the night. At 7,000 feet they had a glimpse of a few stars but hit a downdraft that put them back to 6,000. It took half an hour to get back and another 30 minutes to break free at 8,000 feet.

Grim Dawn

Dawn was an unhappy and drab affair. The grand-daddy of all turbulence overtook them in a lightning storm and they dropped to 400 feet above the water, where again they met headwinds and tropical deluge, and a fuel consumption rate one-third higher than estimated to that point. Warner advised by radio that their chances were 50-50 with the gas remaining.

Somehow, 34 hours of flying brought them over the landing strip at Albert Park on Suva Island where they discovered that a field only 1,200 feet long was waiting to receive Fiji's first aerial visitors. The runway was well hidden from clear approach by a row of trees. Kingsford-Smith was so numbed and tired he couldn't walk a minute later, but he dragged the big ship in under power, plunked it down short and ground looped with a blast of power at the last minute when brakes failed to stop the roll. The beefed-up gear and fuselage held and an enthusiastic crowd lifted the crew from the plane.

Their 34-hour ordeal had carried them 3,400 miles and they had a few gallons of gas remaining.

The four rested until June 8, took off from the strip empty and flew to another beach for the fuel load needed on the 1,880-mile flight to Brisbane. The crew had been through so much on the previous leg that another storm between the Fijis and Australia seemed hardly more than anti-climactic.

"The Southern Cross" reached Brisbane about noon of June 9. By now the Australian Government concluded the flight was a great idea and, after more than half of Sydney's population turned out to cheer their final landing, a proposal to grant the crew an award of $25,000 was approved.

Their backer, Mr. Hancock, wrote them a title of ownership for the plane and paid all remaining bills in a handsome gesture.

More to Come

Sir Charles went on to still greater glory. "The Southern Cross" saw him westbound over the Atlantic in 1930 with Capt. Patrick Saul and John Stannage and he then cracked the Pacific a second time from Australia to America in a Lockheed with Capt. O. G. Taylor as co-pilot.

Sir Charles was finally lost on a flight between Australia and England, swallowed up by jungle or sea.

Ulm also kept on. He set a new speed record between Australia and England and ultimately was lost on another Pacific flight in December, 1934, flying a de Havilland twin-engine transport, "The Stella Autralis." He was 19 hours out of Oakland, shooting for Hawaii, and was in radio contact up to the time of his crash, but the wreckage was never found.

Both Warner and Lyon likewise continued their careers in radio and navigation.

As for the old Fokker, "The Southern Cross" was given to the Australian Government for the national museum at Sydney. There she recalls to the folk "down under" the courage and faith of the four airmen who successfully made the first, and possibly the toughest, of all Pacific pioneering flights. END

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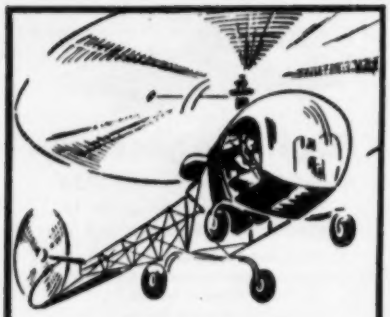

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A Sheepskin—Then What?

(Continued from page 17)

area. Address your letter to Personnel Department, Kaiser-Frazer Corp., Willow Run, Mich.

Lockheed Aircraft Corp.

Maybe M. V. Mattson, employment manager, will visit your college, but if he doesn't, there's still a good chance to pick up one of the openings for 150 engineering majors earning their degrees this June. Mr. Mattson will visit about 45 schools.

He's looking particularly for aeronautical, mechanical and electrical engineering graduates, either with the B.S. degree or advanced degrees. There'll be a limited number of jobs for accounting and business administration graduates but most of them will be filled from around Burbank, Calif., where the California division of Lockheed is located. If you're a math major, with courses in numerical analysis or with experience with electronic computing machines, send him a resume anyway.

Starting pay for engineering graduates with little or no experience runs about $340 a month. Other June graduates may expect $300 to $325 a month.

Write to Mr. Mattson, Employment Manager, California Division, Lockheed Aircraft Corp., 1708 Empire Avenue, Burbank, Calif.

Lycoming-Spencer Division, Avco Manufacturing Corp.

The division expects to have openings for mechanical, aeronautical and industrial engineering graduates. There's also likely to be a spot for a chemist or metallurgist. Salaries to start: $300 to $350 a month. The aeronautical engineer with experience in military service gets preference, and maybe added money.

Junior accountants are needed at $255 to $300 a month. Address: Williamsport, Pa.

McDonnell Aircraft Corp.

Here's a place for Ph.D.'s as well as other advanced degrees. But a B.S. is not overlooked. McDonnell wants June graduates with degrees in aeronautical, mechanical, electrical, civil and industrial engineering. In addition, if you have an M.S. or a Ph.D. in any of these fields, plus physics, you are needed. McDonnell wants men with such background for its airplane, helicopter and guided missiles divisions. The firm can also use a couple of math majors and accounting graduates.

Starting pay for engineers with a B.S. will run from $300 to $350 a month. The amount depends on grades, personality, general background and demonstrated initiative. Salaries for advanced degrees, of course, go higher. Same if you have had applicable military or civilian experience, as a flight test engineer, for example.

Engineering seniors should write to Raymond F. Kaletta, technical placement supervisor. Other seniors should get in touch with C. L. Windsor, Employment Manager. Both addresses are McDonnell Aircraft Corp., Box 516, St. Louis 5, Mo.

North American Aviation, Inc.

North American can put to work anyone with as little as two years of engineering fundamentals.

They have two plants. One makes aircraft; the other specializes in guided missiles, electronics and atomic energy work.

At the main plant in Los Angeles, North American wants graduates in aeronautical, mechanical, civil and electrical engineering, and physics majors. They can use a few chemical and architectural engineers and have openings in accounting, scheduling and industrial engineering.

Send your resume to W. S. Gudmundson, Chief of Engineering Personnel, Guided Missile, Electronics and Atomic Energy Depts., Downey, Calif. Or write to the Personnel Director, International Airport, Los Angeles 43, Calif. The company also needs applicants at its plant in Columbus, Ohio.

Republic Aviation Corp.

Charles J. Ketson, employment manager, makes the point that previous military aircraft experience is "very desirable." The firm wants men with degrees in civil, mechanical and aeronautical engineering.

Republic plans to add about 50 engineers to the payroll this June, starting at $330 a month on average. There may be openings for a few other majors.

Letters should be sent to Mr. Ketson's office, Republic Aviation Corp., Farmingdale, Long Island, N. Y.

Ryan Aeronautical Co.

Ray Morton, employment supervisor, says the firm is not sending representatives to engineering schools this spring but that engineering seniors will be welcomed with special ceremonies at the plant, Lindbergh Field, San Diego 13, Calif.

Ryan expects to hire 1,500 to 2,000 persons during 1953. Prospects for advancement are good.

Sophomores and juniors in engineering might do well to look into summer jobs with Ryan. The company is looking for men with military experience in metalsmithing. Most needed are metalsmiths, metal fitters and machine operators, in addition to engineers.

United Aircraft Corp.

Here will be one of the greatest number of new jobs in the aircraft industry.

United expects to take on several thousand employees in its four major operating divisions this year. Three divisions are in Connecticut and one in Texas.

Personnel managers and their divisions are listed for applicants. They are:

T. R. Downe, Pratt & Whitney Aircraft, 400 Main Street, East Hartford, Conn.

J. P. Sullivan, Hamilton Standard Division, Bradley Field, Windsor Locks, Conn.

Peter Wacks, Chance Vought Aircraft, Box 5907, Dallas, Texas.

R. C. Banks, Sikorsky Aircraft, South Avenue, Bridgeport, Conn. END

Purchase Pains

(Continued from page 18)

luggage. Four-place ships were really scarce, and every time we found one advertised that seemed within our limits, someone else had latched onto it before we arrived.

Then it happened. My son mentioned that a Piper *Pacer* out at the local airfield which had been damaged was for sale. It was practically new. We found that the plane had been ground-looped by a person learning to fly and needed a new wing and other minor repairs. They were putting on the wing when we went out to see it.

When I heard the asking price for the ship, I almost fell off the chair. It was much more than we could afford. That night I checked carefully on current prices and became convinced that the man wasn't far off on his price.

The next meeting with the owner ended with my signature decorating the dotted line on a purchase contract for one Piper *Pacer*, slightly used.

Ready for Action?

Now I was like a kitten with a new ball of yarn. I wanted to see that plane fly. The workmen at the airport thought the plane would be finished in a few days. The prop had not yet arrived, but was expected any day. I wasn't told that they were not going to release the plane until the insurance company had settled for

(Continued on page 65)

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BEECHCRAFT BONANZAS: 46 available. 1947, #8042GF, has 110 hours since overhaul. Gyros. Omni. $6750. Also; A-35, #68FBF, with new 205 HP engine. Extra tank. Gyros. Omni. $9780. Also; painted 1951 C-35, #898RAF, with zero-time since overhaul. Extra tank. Gyros. VHF. ADF. Flares. Extras. Relicensed. Bargain. $16,300.

BEECHCRAFT D18S TWINS: 6 available. Late 1948 #64SBF, has zero-time since overhaul. Hydramatics. De-icing. Windshield wipers. Five chairs. Exceptional radio. Beautiful. Relicensed. $67,500.

BELLANCA CRUISAIRS: 20 from $3000. December 1947, #7449ZF, has 175 hours since overhaul. Aeromatic. Gyros. Omni. Extras. Hangared. All bulletins. Relicensed. $4600. Without Omni $3500.

CESSNA 170'S: 36 available. 1948, #25-4XVF, has 350 hours. Metal propeller. Primary blind panel. Radio. Hangared. Undamaged. Excellent. $3400. Also; 1950 painted metal, #979SAF, with only 319 hours. Metal propeller. Gyros. Omni. Extras. Hangared. Undamaged. Bargain. $6000.

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CESSNA 195'S: 20 from $8960. 1952 245 HP, #154RDF, has only 325 hours. Crosswind gear. Gyros. Omni. ADF. Like new. $14,150.

GRUMMAN WIDGEONS: 6 from $11,900. G44, #6595PF, has modified hull. Zero-time since overhaul. Recovered, repainted, reupholstered and relicensed August. Metal propellers. Gyros. VHF. Exceptional. $16,300.

LUSCOMBE 8F'S 90 HP: 7 available. Painted 1948, #138TBF, has 315 hours. Engine majored. Metal propeller. Radio. Undamaged. Hangared. All bulletins. Clean. $2500.

NAVIONS: 43 from $5000. 1946, #9147FF, has only 396 hours. Extra tank. Gyros. Loop. Hangared. Undamaged. All bulletins. Relicensed January. $5750. Also; painted 1947, #868RHF, with 205 HP engine. Low time. New metal propeller. Extra tank. Gyro. ADF. Late improvements. $7150. Also; 1948, #429SKF, with only 256 hours. 205 HP engine. Extra tank. Gyros. ADF. Beautiful. $8750.

NAVION 225 HP: Newly painted late 1948, #449XKF, with 710 hours. 120 hours since overhaul and installation new desirable 225 HP engine. Hartzell propeller. Long stacks. Wheel fairings. VHF. ADF. Like a 1949. $7800.

NAVION SUPER 260'S: 8 available. #522-ZKF has only 365 hours. Replacement engine 5 hours. Metal Hartzell. Gyros. Omni. Beautiful. Bargain. $13,750.

NOORDUYN NORSEMEN: 6 from $12,000. Painted #5977PF has 600 HP P&W engine with 148 hours since overhaul. Aircraft and propeller 23 hours since overhaul. Corrosion-proofed. Six passenger seats. Recovered December. Gyros. ADF. Beautiful. Probably best in country. $14,000.

PIPER CLIPPERS: 12 available. #527PHF has 300 hours. Original purchaser. Metal propeller. Pants. Radio. New condition. Hangared. Relicensed. Bargain. $2450. Also; #532PHF with 350 hours. Metal propeller. Primary blind instruments. Omni-range. Extras. $3000.

PIPER PACERS: 22 from $3250. #768JKF has 347 hours. Metal propeller. Primary blind instruments. Radio. Relicensed September. $3500.

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You have a neighbor who might buy your airplane. He has probably contacted us. Be sure we have your ship to offer him.

PIPER TRI-PACERS: 20 available. September 1951 #142SAF, has 235 hours. Metal propeller. Primary blind instruments. Omni-range. Relicensed September. Corporation-owned. Undamaged. Hangared. Exceptional. $4250.

REPUBLIC SEABEES: 11 from $2000. Painted, #600GKF, has 300 hours. Steerable tail wheel. Stainless cables. Undamaged. All bulletins. Excellent inside and out. $2250. Also; 1947, #635GKF, with 325 hours. Large propeller hub. Steerable tail wheel. New upholstery and cushions. Excellent. $2750.

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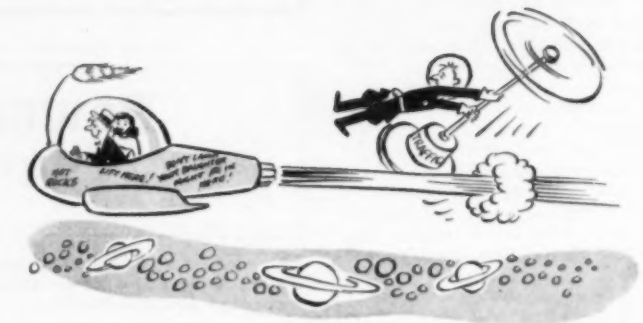
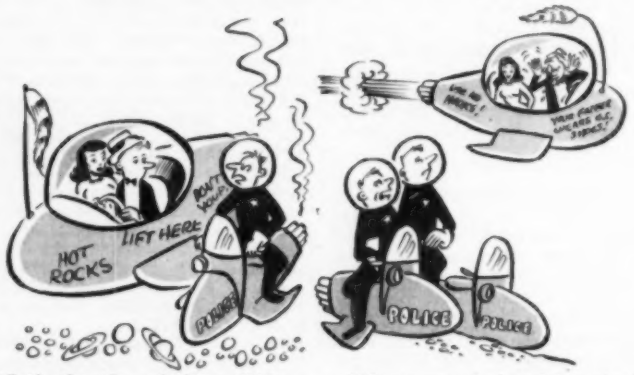
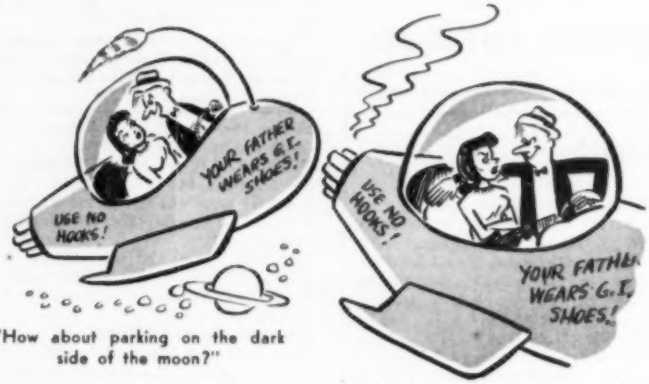




"What's the idea of doing 2500 in a 1000 mile an hour zone?"

"It's no use. I chased him plumb to Jupiter yesterday."



"How about parking on the dark side of the moon?"

"Not that old gag about running out of rocket fuel?"

"This is the last time I take out a girl with body-helio."

(Continued from page 63)

the repairs. Neither did they tell me that the bill for the repair of the plane could not be sent in until the CAA man had passed on the repairs. Perhaps I was supposed to know these things, but how?

Then there was the paint job. The ship was supposed to be like new when completed, and the insurance company did not think it their responsibility to match the paint. The old finish had faded somewhat. Well, more water ran under the bridge. The prop finally arrived and was installed. I wanted them to go ahead and license the plane so that when the plane was cleared there would be no delay in getting it in use. But when I asked about having the work done, I was told it could not be done until the Weight and Balance sheet was found. This was a new kind of sheet to me so I found out as much about it as I could: its color, size, when last seen, etc. For two days I played Hawkshaw, and finally found it. Armed with this document, we went out to the shop and were told we had saved ourselves 50 bucks by finding it.

I authorized the necessary inspection work and the work was started and stopped the next day. When I asked why they had stopped, I was told that only the owner of a ship can authorize the licensing of the same, and inasmuch as I did not have the bill of sale I could not authorize it. Finally I was informed by the former owner that he had that day received settlement from the insurance company and had mailed a check to the firm doing the repairs. Now I could get the plane at last.

Time Element

Next day I went out to see about getting possession of the plane and was told that the repair bill had not been paid and therefore I could not get delivery on the ship. Now I was in a jam. In my purchase contract I had inserted a clause which stated that the balance due on said ship would be paid after inspection and acceptance by the purchaser. And I couldn't even authorize any work to be done on the ship.

I called the dealer in Atlanta and explained the situation and he said if I would pay the balance he would wire them to release it to me. This I did and the former owner agreed to pay the repair bill at once, so that the plane could be released to me. I called the company which was making the repairs and they said all I needed now was the bill of sale. I called the airport and was informed that they had received instructions by wire from Atlanta to release the plane to me. All I had to do now was to sign a form and I could get possession of the plane. Well, I went rushing out to sign the form, but on arrival was told they did not have a blank form, but would have some on Wednesday. Wednesday came and went and no forms. Thursday I had a call from them asking me to come out to the office. The CAA man was in town.

"For My Own Good"

Right here I want to mention that my mental condition had reached a new low. Being Scotch, Irish and English I was hardly in condition to discuss anything calmly. Well, the CAA man spent about three hours with me explaining everything and getting me straightened out. He was very nice and had undoubtedly come across other cases like this one. He made me feel everything was done for my own good. Next morning the bill of sale arrived, with the application for license attached—and the plane was mine. O Happy Day!

Now, of course, we know all the "red tape" we encountered was for our safety and protection. To prospective owners, I would say: Be patient. It is worth the wait. To service men and dealers I would say: Take time to explain to the prospective customers. He may be ignorant of CAA rules, and in order to have a satisfied customer it is better to have a complete understanding from the beginning. I for one want to be known as a completely satisfied owner of a Piper *Pacer*. It was really worth the 25 days of watchful waiting. END

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